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BLACKHILLS NATIONAL FOREST



Tenderfoot Creek 1890s

FY2004 MONITORING AND EVALUATION REPORT

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Black Hills Forest Plan Monitoring and Evaluation Report Fiscal Year (FY) 2004 (October 2003 through September 2004)

What This Document Is

This is the annual monitoring and evaluation report for the Black Hills Land and Resource Management Plan (Forest Plan). A revision of the Forest Plan was completed in June 1997. The first amendment to this Forest Plan was completed in May 2001.

The basis for the annual monitoring report is in Chapter Four of the Forest Plan. This report does not discuss the entire inventory and monitoring that occurs in the Black Hills but only monitoring information related to the Forest Plan. More detailed studies may occur in association with individual projects that implement the Forest Plan. When relevant to Forestwide trends, information from these site-specific projects is incorporated into Forestwide monitoring.

The Black Hills Monitoring and Evaluation Report focuses on effectiveness monitoring, which focuses on whether or not the Forest is meeting or moving toward established objectives set forth in the 1997 Land and Resource Management Plan. Implementation monitoring or monitoring to insure standards and guidelines are implemented as directed in the Plan is a minor part of this monitoring report. The Washington Office (WO) appeal decision on the 1997 Land and Resource Management Plan directed the Forest to conduct more intensive monitoring than was originally in the 1997 plan.

The Forest has developed a "Monitoring Implementation Guide" to describe methods on how to implement the monitoring and evaluation requirements of the Revised Plan; see <http://www.fs.fed.us/r2/blackhills/projects/planning/2001Monitor/MonGuide.pdf>

Several environmental factors are monitored each year; however not every item is scheduled for evaluation and reporting on an annual basis. Chapter Four of the Forest Plan indicates how often each item is reported.

Supporting documentation for this report is located in the Supervisor's Office, Black Hills National Forest.

Forest Plan Amendments

The Black Hills National Forest has undertaken changes to the 1997 Revised Land and Resource Management Plan (Forest Plan). These changes, or amendments, are in response to direction from the Chief of the Forest Service in his October 1999 decision on various appeals of the Revised Plan and to the settlement agreement stemming from the Veteran Salvage Timber Sale lawsuit. These changes are being accomplished in two phases.

In late August 2000, the Forest Service signed an agreement with several groups settling a lawsuit filed in November 1999. The lawsuit challenged implementation of certain projects on the Forest. Because of the settlement agreement, changes must be made to certain timber sales under contract and certain sales not yet sold, which are covered in the scope of the agreement. The Forest is continuing to make these changes as required.

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The Phase I Amendment was completed, and the Regional Forester issued the decision in May 2001. This amendment contains interim protections for a variety of wildlife and plant species and allows the Forest to proceed with some limited project decisions for the next two to five years. The Phase I Amendment decision was appealed but was upheld on review.

The Phase II Amendment process was officially initiated on November 28, 2001. Scoping comments were requested by January 28, 2002. The Phase II Amendment Draft Environmental Impact Statement was released in September 2004. The focus of this amendment is broader than Phase I and includes investigating strategies to address risks from fire and insects; reviewing protections for a variety of plant and animal species; and evaluating and designating research natural areas as appropriate. This significant amendment is targeted for completion in 2005.

Visit the Black Hills National Forest website at www.fs.fed.us/r2/blackhills for ongoing Phase II Amendment information.

BRAD EXTON
Acting Forest Supervisor

Date

Monitoring Item 1: Air Quality

Objective 101: Maintain air quality standards in accordance with state implementation plans.

Monitoring:

The Black Hills National Forest continued to provide representation at the quarterly Pennington County Air Quality Board meetings during the year 2004.

The Forest experienced no violations of the Clean Air Act on the Black Hills National Forest for the year 2004 nor were there any air-quality complaints from individuals or other entities attributed to National Forest project activities (South Dakota - Administrative Rules - Article 34:10; Wyoming – Air Quality Standards and Regulations - Chapter 10). There was one noted complaint from a Rapid City resident who complained of smoke-filled air and health related concerns. The individual was contacted and his concerns addressed when it was confirmed that air-quality conditions were the result of burning and other air-quality degradation from within the city. The Forest has implemented new Wyoming open burning restrictions (effective May 14, 2004) and is prepared to implement new smoke management requirements effective January 1, 2005.

Prescribed burning on the Black Hills National Forest, including forest-residue-pile burns, remains the single greatest potential air degradation activity. The Forest saw a significant increase in its prescribed burning activities in FY2004 from 3,481 to 6,807 acres. The increase in acres from 2003 was due in large part to increased funding and favorable burning opportunities in the fall of 2003 and spring of 2004. The revised Forest Plan establishes an annual objective of 8,000 acres of this type of activity. The Forest is making every effort to increase the amount of fire restoration treatments; however key to that effort is available funding. Increased emphasis here will likely result in reduction in the amount of other types of burning that occur, including wildfire and pile burning to dispose of forest residues.

The following mitigation actions are implemented on the Black Hills National Forest during prescribed burning activities to minimize air-quality degradation:

- Receptors such as subdivisions, roads, towns, and other air-quality sensitive areas are identified during the prescribed burning planning process.
- Burning prescriptions are identified in the "prescribed burn plan" to ensure that the air-quality standards are maintained in receptor areas.
- Prior to implementation of an approved prescribed burn project, weather conditions (predicted and current), including smoke dispersal predictions, are assessed to insure smoke management criteria can be met.
- Air quality is monitored on site and at receptor areas during burn implementation to insure that air quality remains within identified parameters.

The Black Hills region has no non-attainment areas identified at this time (EPA. 2003. Criteria Pollutant Area Summary Report. Green Book. URL: <http://www.epa.gov/air/oaqps/greenbk/anc12.html>. February 6). Rapid City, South Dakota remains the key area of concern in that it is close to being designated a non-attainment area for PM-10, which is a pollutant often produced by smoke and dust. The concern for air quality in the Rapid City area has resulted in the Forest working jointly with the Rapid City Air Quality Office on guidelines for all National Forest burning activities. This 1995 guideline places restrictive measures for all forms of open burning planned on National Forest System land in the Rapid City air shed. The Forest

continues to work with the Pennington County Air Quality Office in mitigating all potential air-quality-impacting activities.

The State of South Dakota continues to add to and develop its long range air-quality monitoring database that will assimilate air-monitoring data, air-quality-influencing events, and weather data from 1990 to the present. The Forest assists the State by providing information on the occurrence of wildfires and prescribed fire activities on the Forest to keep the database current. In addition to activities on the Forest, information from other area land management agencies including the Bureau of Land Management, Fish and Wildlife Service, Bureau of Indian Affairs, and State of South Dakota is entered in the database. Air monitoring data will come from the three area monitoring sites currently established at Rapid City, the Badlands, and Pine Ridge. Once established this data base will represent a comprehensive resource available to land management agencies in monitoring air-quality trends and in determining air-quality links with various resource management activities and/or weather phenomena.

The State of South Dakota remains the key sounding board when it comes to air-quality issues related to management activities conducted by the Forest. Every effort is made to address air-quality concerns prior to project implementation so that adjustments can be made as needed to mitigate air-quality issues.

Evaluation:

The Black Hills National Forest management activities, primarily prescribed burning, have met state clean air standards over the last five years. The Forest has accomplished approximately 35 percent of the prescribed burning objective in the Forest Plan over the last six years, but has exceeded the historic annual level of wildfire acreage contributing to an above average level of emissions when considering combined effects of wildfire and management induced particulates.

Monitoring Item 9: Vegetative Diversity and Snag Retention

Objective: 211. In Ponderosa pine forested portions of a watershed, maintain an average of 2 hard snags per acre on south facing slopes and 4 hard snags per acre on north facing slopes, well dispersed across the watershed through the rotation. Calculate as a per acre average for the watershed; some acres may have no snags while others may exceed the average. In other forest types maintain an average of 6 hard snags per acre, well dispersed across the watershed. (Revised Amendment 1.)

Monitoring:

Snag densities have changed from what was reported in FY2003. There has been additional tree mortality caused by insect infestation (see Monitoring Item 20b). See previous years monitoring reports and Five-Year Evaluation Report for additional information.

Snag Study II report documents more recent snag data for the Black Hills National Forest. **Table A1** below is from Snag Study II and displays the study findings.

See also the addendum to wildlife use of snags in managed ponderosa-pine stands, Black Hills National Forest-Final Report, May, 2004, by David J. Spiering and Richard L. Knight.

Table A1: Snags per acre by diameter class in each Ranger District and across the Black Hills National Forest.

	Bearlodge RD	Hell Canyon RD	Mystic RD	Northern Hills RD	Forestwide
3"-9" DBH	18.1	13.8	18.6	16.8	16.4
9"-15" DBH	6.3	2.8	3.6	3.1	3.3
15"-19" DBH	0.6	0.5	0.5	0.5	0.5
> 19" DBH	0.1	0.2	0.1	0.1	0.2

For additional snag information reference the Draft EIS for Phase II forest plan amendment Chapter 2 Forested Ecosystems.



Snag

Monitoring Item 13: Regeneration

36 CFR 219.27(c)(3) When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exists to adequately restock the lands within 5 years after final harvest. Research and experience shall be the basis for determining whether the harvest and regeneration practices planned can be expected to result in adequate restocking. Adequate restocking means that the cut area will contain the minimum number, size, distribution, and species composition of regeneration as specified in regional silvicultural guides for each forest type. Five years after final harvest means 5 years after clearcut, 5 years after final overstory removal in shelterwood cutting, 5 years after the seed tree removal cut in seed tree cutting, or 5 years after selection cutting.

Monitoring:

Surveys for natural regeneration were done on 17,334 acres in FY2004. Out of the total acres surveyed, 10,294 acres were certified for regeneration. The remaining 7,040 acres will be surveyed within the next few years to determine certification.

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Surveys (third-year and fifth-year) are conducted before certification is established; certification may be established at any point in the three surveys that regeneration is verified.

The source of this data is from the FY2004 SILVA99 Report for the Black Hills National Forest.



Regeneration

Over time, the acres certified will equal the acres surveyed.

Ponderosa-pine seed is produced almost every year, with abundant crops every two to five years (Boldt and Van Deusen 1974), although seed production on the Limestone Plateau and some portions of the Bearlodge Mountains has been sporadic in recent years. In areas with prolific seed production and favorable climate, natural regeneration of ponderosa pine can be quite successful. Frequent rain showers throughout the growing season, which lasts from early March to August, are the major climatic factor contributing to the prolific growth and establishment of ponderosa pine. (Ecology, Silviculture, and Management of Black Hills Ponderosa Pine by Shepperd and Battaglia RMRS-GTR-97, September 2002)

Silvicultural treatments use the recommended systems found in Black Hills silvicultural documents. (Boldt 1974 and Shepperd 2002) The Forest does not remove the overstory in shelterwood silvicultural systems until the understory is established as the result of seed cuts.



Regeneration

Monitoring Item 14: Timber Production

Objectives:

303. Offer the following allowable sale quantity (ASQ) of timber on suitable and available timberlands in the next decade:

Allowable Sale Quantity From Suitable Lands:		
Sawtimber	Decade Total	Average Annual
Cubic Feet	181 mmcf	181,000 ccf
Board Feet	838 mmbf	83.8 mmbf
Roundwood		
Cubic Feet	21 mmcf	21,000 ccf
Board Feet	N/A	N/A
Total		
Cubic Feet	202 mmcf	202,000 ccf
Board Feet	838 mmbf	83.8 mmbf

Monitoring:

The allowable sale quantity (ASQ) in the Forest Plan is based on the total during the decade from FY1997 through FY2006. (Record of Decision, page ROD-35)

The ASQ is a maximum level of timber that may be sold during the first decade after plan approval. A ceiling on the level of timber that can be sold, the ASQ takes into account available funding, other multiple-use values, and compliance with standards and guidelines that provide environmental protection. ASQ is not an absolute yield that must be achieved (1997 Forest Plan FEIS, page II-36).

Harvest acreage over the decade in the Forest Plan is an estimated 255,000 acres or average 25,500 acres per year at full funding level.

1997 Forest Plan Objective 303 - ASQ 83.8 mmbf Average Per Year						
	Black Hills National Forest					
Year	Funded Target		Offer	Sold	Cut	Harvested
	mmbf	ccf	mmbf	mmbf	mmbf	Acres
1998	73.4	146,800	77.0	78.6	62.0	14,307
1999	70.8	141,600	82.7	73.5	73.0	14,238
2000	70.0	140,000	2.8	36.2	65.7	13,567
2001	69.0	138,000	36.5	38.2	75.4	12,442
2002	60.0	120,000	49.5	52.3	62.4	15,123
2003	54.5	109,009	72.8	78.0	67.7	16,500
2004	61.1	122,200	74.5	80.0	70.0	17,795

Monitoring Item 17: Forage Utilization

Objective 301.

Produce on a sustained basis and make available up to 233 million pounds of forage for livestock and wildlife use each year (weather permitting). The location and amount of forage produced under the forest canopy will vary with the density of the overstory. This may necessitate changes in where and how both livestock and wildlife grazing takes place on a local basis over the rotation of a stand of timber.

a. Livestock use will be up to 127 million pounds of forage per year or approximately 128,000 AUMs.

b. Wildlife use will be up to 106 million pounds of forage per year or approximate population levels of 70,000 deer and 4,500 elk or other combinations that use the same amount of forage.

Monitoring:

The objective listed above relates to annual projected livestock forage use. The Phase I Amendment to the 1997 Land and Resource Management Plan changed Guidelines 2505 and 2506 to standards. These two standards relate to proper use or residual levels in riparian and upland forest rangeland settings.

Following direction in Standard 2506, districts continue to develop new Allotment Management Plans (AMPs) for allotments recently approved environmental assessments. The districts issue Annual Operating Instructions (AOIs) for each allotment on the Forest. Utilization or residual guidelines are included in the AMPs and/or AOIs.

In FY2004, actual grazing use on the Forest was 118,919 AUMs. This is approximately 93 percent of the annual projected Forest grazing capacity of 128,000 AUMs available for livestock utilization identified in the 1997 Forest Plan. Two reasons for not meeting projected Forest Plan AUMs were the loss of forage in allotments because of the dry conditions and economic pressures in the cattle industry. Phase I Amendment did not reduce the grazing capacity for livestock use.

Items Monitored	2003	2004
Livestock AUMs Grazed	122,971	118,919
Livestock AUMs Permitted	124,993	124,993

Districts monitored and evaluated approximately 771,800 acres of rangelands on range allotments to determine forage utilization. Following is a breakdown of acres and grazing allotments monitored by ranger district:

Items Monitored	Hell Canyon RD	Mystic RD	Northern Hills RD	Bearlodge RD
Acres Monitored and Evaluated for Livestock Forage Utilization	296,380	195,280	180,648	99,523
Grazing Allotments Evaluated	32	26	16	17

The monitoring is completed by both Forest Service range staffs and livestock permittees. The districts collected forage utilization data by ocular estimate, photos, and stubble height measurements on key areas throughout the allotments. Forage utilization on the allotments surveyed was within Forest Plan standards. The use on a few areas in some allotments did exceed proper allowable use guidelines; however these areas represent a small percentage of the overall utilization on the Forest.

Findings and conclusions relevant to the evaluation follow:

1. Forage utilization throughout all the allotments surveyed were within Forest Plan standards (2505 – Proper Allowable use Guidelines) and allotment management objectives. Measured forage utilization exceeded proper allowable use guidelines on a small amount of areas within allotments surveyed (less than 5 percent) these areas will continue to be monitored to see if management changes are needed. Due to dry and drought conditions, use was reduced on some allotments.
2. The Forest continues to promote more permittee assistance in monitoring grazing allotments with training sessions and using the Wyoming Range Guide and Black Hills Range Guide.

Monitoring Item 18a: Sensitive Species (Plants)

General Information:

The completion of monitoring is dependent on appropriated funding and availability of personnel; therefore a prioritization strategy was developed to serve as a working guide to prioritize monitoring for sensitive plants. This working guide is expected to be updated on a periodic basis as new information becomes available.

The year 2004 was considered a drought year for the State of South Dakota. This information was obtained by accessing U.S. Drought Monitor at www.drought.unl.edu/dm/monitor.html.

Noxious weed information is discussed for various species. For information regarding the treatment of weeds on the Black Hills National Forest please refer to the following: Black Hills National Forest Land and Resource Management Plan (1997), Black Hills National Forest Noxious Weed Management Plan (2003), and Draft Phase II Amendment to the Forest Plan (2004).

***Viola selkirkii* (Great-Spurred Violet)**



Photo by Forest Staff at *Viola selkirkii* site VISE2-11, May 12, 2004.

At the end of the 2003 monitoring season, eighteen occurrences of *Viola selkirkii* were known to occur within the Black Elk Wilderness, Norbeck Wildlife Preserve and Custer State Park in the Black Hills, including one new occurrence recorded in 2003 in the lower elevations of the Norbeck Wildlife Preserve. Eleven of the occurrences that were known at that time were located within four distinct watersheds on lands administered by the Black Hills National Forest. The other seven occurrences were located within Custer State Park. A 2003 late summer observation was made of a likely *Viola selkirkii* occurrence (individuals estimated in the 500-1000 range) in the Upper Pine Creek Research Natural Area. Plans were included to return to the site during the 2004 field season for species confirmation. Because additional potential habitat is believed to occur in relatively remote areas of the Black Elk Wilderness, there may be additional occurrences not yet documented.

On the Forest, *Viola selkirkii* is relatively secure from most potential risks, with the potential exception of an extreme climatic change. As of the end of the 2003 monitoring season, the 10 previously known occurrences on Black Hills National Forest lands were not considered to be at risk from management activities (i.e., timber management and grazing is not currently occurring at known occurrences) but may be vulnerable to impacts from hikers and rock climbers in the future. In addition, invasion by noxious weeds or other exotic plant species and efforts to control them, and trampling or browsing by elk or mountain goats, or future fire suppression efforts are potential risks at some sites. Naturally occurring periodic flooding may reduce the size and extent of some patches, but may create habitat for others. The new Sunday Gulch occurrence found in 2003 was originally documented as two primary sub-populations. One of the documented sub-populations was located along a small creek and is also located approximately 30 meters from a summer cabin. The other documented sub-population was located upstream near the Custer State Park boundary and the Sunday Gulch Trail. No trampling effects were observed at the time baseline data were collected; however trampling effects were recognized as a potential risk because of the proximity to the cabin and the trail. In addition, a portion of the occurrence is located beneath an overhead electric line, and maintenance activities have occurred (tree trimming). Some of the *Viola selkirkii* plants occur in among the slash from the tree trimming activities.

The monitoring strategy for this species on Forest Service land currently includes: 1) surveys for additional occurrences, 2) inventory of new and currently known occurrences on a periodic basis, and 3) annual monitoring of one of the three largest occurrences. The 2004 monitoring design included annual monitoring of the new Sunday Gulch occurrence. Potential survey sites include watersheds where the species is known to occur, as well as other high elevation watersheds with deep canyons and boreal vegetation. Surveys and monitoring occur during the violet's flowering period, which is generally from May 10 to May 30, when the

species can most easily be identified.

The current monitoring design includes re-inventory of known Forest occurrences at least every five years, and to collect data on all known sites in the same year. In addition to periodic inventories, monitoring includes obtaining baseline data on known Black Hills National Forest occurrences during and following a drought cycle (or at least two consecutive years of below-average precipitation). Occurrence numbers collected in 2000 and 2001 may be a reflection of a series of relatively wet years since 1996 (NOAA 1996-2001). Documenting relative number of individuals at the occurrences and extent of great-spurred violet during dry years will hopefully provide insights into the role that precipitation plays in the distribution and abundance of this species. Finally, the monitoring design includes monitoring *Viola selkirkii* sites affected by a fire or significant flood event.

The current protocol design included annual monitoring of “Violet Valley” in the Norbeck Wildlife Preserve. The “Violet Valley” site was selected because it is one of the three largest occurrences of great-spurred violet on Black Hills National Forest lands, it is relatively accessible, and it has the largest combination of potential risks from hikers, elk, random stochastic events (i.e., wildfire, flooding), and exotic plant (includes noxious weeds) invasion. Annual monitoring of the Sunday Gulch occurrence was included into the 2004 protocol design because of the combination of potential risks associated with powerline activities and potential human trampling disturbances. Although no weeds were observed at the Sunday Gulch site, there is potential for exotic plant invasion. Further, because these are two of the lowest elevation sites, it is likely that any declines associated with drought conditions would occur here before they would occur at higher elevations. For the 2004 monitoring design, Violet Valley and Sunday Gulch locations were to be used as an indicator of whether to monitor other occurrences. The trigger for additional monitoring was based on whether there was an absence of one or more of the four largest patches (there are nine distinct patches) at the Violet Valley site, or the absence of one of the two sub-populations at the Sunday Gulch site. If any were absent, an effort was to have been made to document the reason (that is, drought, elk, weeds) and to have selected two additional *Viola selkirkii* occurrences to monitor based on the cause of the disruption and current information on known risks to other sites.

Monitoring Design and Information:

1. On an annual basis, monitor presence/absence of the four largest sub-populations at site number VISE2-2, “Violet Valley” and the two sub-populations at VISE2-11, Sunday Gulch. If one or more of the four largest sub-populations at “Violet Valley” or one of the two sub-populations at Sunday Gulch are not present, document the reason (i.e., drought, elk, noxious weeds) if it can be determined. Select two other sites in other drainages to monitor presence/absence to determine if other populations are being affected in the same way.

Monitoring of *Viola selkirkii* at site number VISE2-2, “Violet Valley” occurred on May 11, 2004. The four largest sub-populations were present.

Monitoring of *Viola selkirkii* at site number VISE2-11 (Sunday Gulch) occurred on May 11, 2004. Both sub-populations were present. Immediately adjacent habitat was searched extensively since it was apparent that *Viola selkirkii* was in full bloom. *Viola selkirkii* individuals and patches were documented both upstream and downstream of the 2003 sub-population locations. The occurrence extends for approximately 0.5 miles, and extends into Custer State Park.

2. Document any weeds designated as noxious by South Dakota and Wyoming. Document if the weeds are co-located with *Viola selkirkii* or at what distance the weed species is located away from the occurrence site.

A few scattered Canada thistle individuals (*Cirsium arvense*), documented as noxious by South Dakota or Wyoming were present near the margins of VISE2-2 on May 11, 2004. No South Dakota or Wyoming designated

noxious weed species were present at site VISE2-11 on May 11, 2004.

3. On any currently known *Viola selkirkii* site that is affected by a flood or fire event, monitor for presence/absence.

What was considered to likely be another occurrence of *Viola selkirkii* was reported late in the summer season of 2003, but the species could not be verified. A fire occurred in the Upper Pine Creek RNA, (Elkhorn Fire) on October 9, 2004, affecting approximately 40 acres, within the general vicinity of the late season observance. The reported location was returned to during the blooming period and plants were verified as a *Viola selkirkii*. Baseline data were gathered at that location (site number VISE2-12) on May 25, 2004.

At a later date, an observation was made of another likely occurrence in the Elkhorn Fire burned area. On June 8, 2004, *Viola selkirkii* individuals were verified both within burned and unburned areas. Baseline data were collected at this new location (site number VISE2-13).

No other occurrences were known to be affected by a flood or fire event prior to the monitoring period. No flood or fire disturbances were observed at the previously known sites monitored in 2004.

The Monitoring Design also includes re-inventory of known Forest occurrences at least every five years, and to sample all known sites in the same year. In addition to periodic inventories, monitoring includes obtaining baseline data on known Black Hills National Forest occurrences during a drought cycle. The five year re-inventory and drought year baseline data collection occurred during the 2003 monitoring season.

Although not included in the monitoring design, data were gathered at two other *Viola selkirkii* sites in addition to the two designated monitoring sites to continue to document information through various climatic conditions. *Viola selkirkii* individuals were present at these occurrence locations (site numbers VISE2-3 and VISE2-4).

With the two new 2004 reported *Viola selkirkii* occurrences on the Black Hills National Forest, and the new 2004 observance at Mount Rushmore National Memorial, 21 occurrences of *Viola selkirkii* are now known from the central granitic core area of the Black Hills.

***Epipactis gigantea* (Giant Helleborine)**

The only known occurrence of *Epipactis gigantea* is located along Cascade Creek in the southern Black Hills. The species is located on land administered by the Black Hills National Forest at Cascade Springs. This occurrence is a portion of a larger population which extends downstream on private land and The Nature Conservancy's Whitney Preserve. Recent data (2000-2002) document increased extent of the orchid in comparison to earlier reports. However the current size of the orchid population could be in response to several recent years of higher than average moisture in the Black Hills (NOAA 1996-2001) as well as recent conservation activities taking place in the Cascade Creek valley. The population appears to be stable or increasing, but there is insufficient data to demonstrate a trend at the present time.

The confinement of this species to a single watershed in the Black Hills makes it vulnerable to random events such as extreme drought or a disease outbreak. However, the relatively constant water from springs with origins from a deep underground source increases the likelihood of persistence of the species. In addition, the existence of multiple subpopulations of the species in the watershed will potentially help buffer against any potential catastrophic disturbances in the area.

Effects associated with ongoing recreational use and invasion by, or treatment of, exotic plant species (including noxious weeds) are currently considered to be the most significant risks to the stream orchid and its habitat on the Black Hills National Forest administered lands. Footpaths and visitor created "nick trails" (visitor created paths that have been or can be created simply by recreationists leaving the developed established trail system to access sections of Cascade Creek), trampling of vegetation, or mowing near

Epipactis gigantea patches have been identified as past or current impacts to the species and its habitat. Portions of the population occur in areas naturally restrictive to recreational access by dense vegetation or inaccessible slopes, and therefore are unlikely to be impacted by recreationists. *Cirsium arvense* (Canada thistle) is a state listed noxious weed and, *Elaeagnus angustifolia* (Russian olive), and *Tamarix sp.* (salt cedar), are non-native invasive species of concern, which currently occur in the Cascade Creek Valley. *Lythrum salicaria* (purple loosestrife) is not known to occur within the Cascade Creek Valley, or anywhere close by, but due to its aggressive nature, if it were to invade, it would have the potential to impact riparian natives such as *Epipactis gigantea*.

Additional potential risks to the species could include alterations to the habitat by hydrologic or geologic modifications, or from erosion. Although no evidence of plant collection has been documented to date, it could also be a potential future risk to *Epipactis gigantea* along Cascade Creek since the area has been identified as a botanical attraction in local tourist information and other publications.

Quantitative monitoring is problematic as some areas at Cascade Springs and Cascade Falls are inaccessible or involve high risk of damage to the plants from trampling or dislodging them on steep slopes. Also, because the species expands clonally, it is not possible to determine the number of individual plants. Baseline monitoring began in June 2000 and ongoing annual monitoring is occurring. Monitoring includes verification of presence/absence of mapped patches along stream transects and recording any new patches. The 2004 monitoring design (design is similar to recent previous years) included documenting any changes to the population to be indicated on a baseline map diagram. Monitoring included documenting “nick points or trails” that actually extended into *Epipactis gigantea* patches. Monitoring also included documenting stream bank erosion, weeds or other disturbances in or near the populations. If the extent of the current year’s mapped patches is documented to decline by 10 percent or more, the monitoring design triggers consultation with ecologists, botanists and biometricians knowledgeable about the species to develop a more rigorous monitoring strategy. Monitoring is most efficiently conducted during the orchid’s flowering period in June.

As of 2001, the U.S. Geological Services (USGS) gauging station at the southern end of J. H. Keith Cascade Springs Picnic Ground is no longer being monitored by the USGS. A water level monitor (piezometer) had been considered for installation for 2002, but it was then determined that the site does not lend itself to using this monitoring method. In consultation with the Rocky Mountain Research Station on February 6, 2003, the monitoring design to measure water levels was revised and included permanently placing two water-level measuring devices at two of the springs (one at each of two springs) in 2003 if possible. Because of heritage resource concerns, these two water measuring devices were not installed. Plans for the 2004 monitoring period were to determine if permanent transects could be placed across the stream to measure water levels.

Monitoring Design and Information:

1. Monitor presence/absence of patches along stream transects on an annual basis. If the number of patches decline by 10 percent or more, consult on a more rigorous design with the Rocky Mountain Research Station.

Fifty-five patches of *Epipactis gigantea* were located in 2004 at Cascade Springs. Forty-six patches were counted in 2003. Forty patches were counted in 2002 and 2001. There is no decline in the number of patches from those documented in 2003.

2. Recreation nick point: Document the number of nick points that actually extend into populations.

There is a nick-point trail (observations indicate low use) that extends into the orchid patch at the uppermost headwater springs.

Recreation access through another nick point that was documented during 2002’s monitoring season has been limited by a fence that was constructed a couple of years ago. In 2004 there was no evidence that the recreational

use on this nick-point trail was extending into the orchid patch.

A third nick-point trail (previously documented in 2000), continues to overgrow with shrubs; however a trail paralleling a fence leads to a cement platform below this nick point. The nick point itself does not extend into patches of *Epipactis gigantea*; however the patches could be accessed.

A fourth historical trail leads from the picnic ground gazebo north to Cascade Creek and continues to be intensively used by recreationists. Two smaller less intensively used nick-point trails have developed off this main trail and extend down to the creek. The end of the main trail is adjacent to several small clumps of *Epipactis gigantea* and some trampling was observed in 2004.

A very short nick-point trail is becoming defined near the gazebo (west of point RP6) and extends into a patch of *Epipactis gigantea*.

Another side trail extending west from the trail north of the gazebo (past the bridge) now extends into an orchid patch.

No *Epipactis gigantea* patches have disappeared in areas where nick point trails extend into the occurrences.

3. Evaluate the Cascade Springs site for the potential placement of permanent transects to measure water levels across the creek. If installation is possible, monitor water levels on an annual basis on the same calendar date from year to year.

Cascade Springs was evaluated for the potential placement of permanent transects to record water levels. On July 2, 2004, two transects were installed and water levels were documented at 0.5 meter intervals. The average stream depth on that date at Transect No. 1 (upstream transect) was 11.9 centimeters and the average stream depth at Transect No. 2 (downstream transect) was 21.5 centimeters.

4. Document any weeds designated as noxious by South Dakota and Wyoming, and the following non-native invasive species of concern, *Elaeagnus angustifolia* (Russian olive), and *Tamarix* sp. (salt cedar). Document if the weeds are co-located with *Epipactis gigantea* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

Cirsium arvense (Canada thistle) continues to be present along the stream, including individuals being located in some patches of *Epipactis gigantea*. Russian olive trees continue to be present at Cascade Springs. *Tamarix* spp. was not present.

5. Document erosion patches occurring at any *Epipactis gigantea* patch.

No new erosion patches were observed in 2004 at any *Epipactis gigantea* patch. Past documented erosion patches (erosion observed to be associated with stream movement dynamics) continue to be present.

6. Document any verifiable unauthorized collections of *Epipactis gigantea*.

There was no evidence of unauthorized collections of *Epipactis gigantea* at the time monitoring was completed in 2004.

***Salix serissima* (Autumn Willow)**

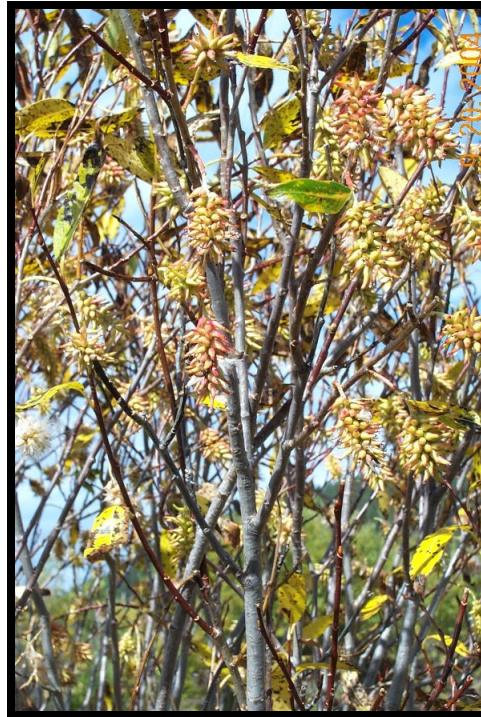


Photo by Forest Staff at *Salix serissima* site SASE2-1, September 20, 2004.

Prior to the 2004 monitoring season, two occurrences of *Salix serissima* were known to occur on land administered by the Black Hills National Forest. Until 2002, a single occurrence of *S. serissima* was known to occur at McIntosh Fen Botanical Area. A second occurrence was discovered in 2002 within a fenced enclosure along Middle Boxelder Creek. Prior to the 2004 monitoring season, the persistence of this species on lands administered by the Black Hills National Forest was thought to be dependent on conserving these two known occurrences.

Because *Salix serissima* is an obligate wetland species, the primary risk to its persistence and reproductive success is any lowering of the water table where it occurs, whether it is natural or human-induced. Noxious weeds, invading woody species (conifer encroachment), fungal infections or insect infestations have been identified as posing concern for this species. *Cirsium arvense* (Canada thistle) currently occurs within the McIntosh Fen Botanical Area, although high soil moisture levels in the fen itself appear to exclude Canada thistle from the autumn willow habitat. *Lythrum salicaria* (purple loosestrife) is not known to occur at either of the sites, or anywhere close by, but is very aggressive and has the potential to out compete riparian natives including *S. serissima*. A fungal infection was noted on the leaves of autumn willow at McIntosh Fen in 2001 and willow borer has been documented at the Middle Boxelder Creek occurrence. Fishing occurs along Castle Creek (near the fen) in the McIntosh Fen Botanical Area, and a designated snowmobile trail crosses the Botanical Area but does not extend into the *S. serissima* occurrence. At this time no impacts have been documented to the willow from either activity. Although no impacts have been documented from wildlife use or trespass cattle at these sites, both could be a potential risk at either site.

A rigorous monitoring strategy was designed and implemented in 2000 for the occurrence at McIntosh Fen, and has been revised to add the second *Salix serissima* occurrence, and to continue to attempt to detect and respond in a timely manner to changes in extent and condition of *S. serissima*, and its habitat. The protocol focuses on annually monitoring: 1) the extent of the population, 2) total number of individuals and number of reproductive plants, 3) number of plants infected with rust fungus or other damaging agents, 4) water table level, and 5) presence of exotic invasive species.

Two piezometers were installed at McIntosh Fen in 2001 to annually monitor water levels. However, the piezometers may have destabilized, possibly because of freezing/thawing conditions, or because the fen is a floating mat of organic material. Because the water level had been observed to occur above ground level during higher precipitation years, an above ground water level sampling method may be used. This sampling method was included for the 2004 monitoring design.

Monitoring of *Salix serissima* occurs primarily during the blooming period (June) so that the total number of reproductive individuals can be determined.

Monitoring Design and Information:

On an annual basis at both *Salix serissima* sites (McIntosh Fen and Middle Boxelder Creek occurrences):

1. GPS new endpoints if site boundaries have changed.

There was no expansion or contraction of the site detected in 2004 at McIntosh Fen. Comparing GPS points from previous years to those collected at the site in 2004, there was no change in the general site boundary from the previous year.

In 2004 there was no change in the site boundaries at the Middle Boxelder Creek occurrence when compared to 2003 site boundaries.

2. Count individuals during the blooming period (documenting total number of individuals, and total reproductive individuals). If the number of individuals declines by more than 10 percent, consult on a more rigorous design with the Rocky Mountain Research Station.

Four hundred sixty-two individuals of *Salix serissima* were counted on June 29, 2004 at McIntosh Fen. However a September review of previous counts and Global Positioning System (GPS) endpoints of the sub-populations revealed that individuals at the northern endpoints were missed during the count in June. Following this discovery, a return visit was made to the northern portion of the population at McIntosh Fen and *S. serissima* individuals were present; however due to the seasonal timing a count of individuals could not be made to determine numbers for 2004. *S. serissima* counts from previous years:

2003	764 individuals
2002	560 individuals
2001	453 individuals

Since there was no boundary shift and no dead plants were observed at McIntosh Fen it is not expected that the census data is reflecting a decline in the population. The change in individual counts is expected to be related to issues with missing a portion of the occurrence during the counting of individuals, densities of various portions of the occurrence resulting in difficulty of determining individuals, and with identification of immature *S. serissima* individuals and a similar species *S. pseudomonticola*.

A total of 16 individuals of *Salix serissima* were counted on June 30, 2004 at the Middle Boxelder Creek occurrence. In 2003, 16 individuals were counted. In 2002, 13 individuals of *Salix serissima* were counted. There was no decline in total number of individuals from the previous year.

Two new reports of *Salix serissima* occurrences were reported late in the 2004 season (August). The reported locations are within the general vicinity of Nahant and Silver Creek and less than five miles from the Middle Boxelder Creek *S. serissima* occurrence.

Based on what the Forest has learned about the 2004 *Salix serissima* counts at McIntosh Fen compared to the 2003 monitoring season, along with reports of two additional locations for this species, plans are to consult with the Rocky Mountain Research Station on a refined monitoring design for the 2005 monitoring season.

3. Document the number of plants infected with rust fungus or other damaging agents (i.e., willow borer).

Red spots on some *Salix serissima* leaves at McIntosh Fen were thought to be rust but could not be confirmed on June 29, 2004. The site was returned to later in the season (September 20, 2004) and rust was observed to be present on most plants. Leaf samples were collected and presence of willow rust was confirmed.

No rust or other damaging agent was evident on *Salix serissima* individuals at the Middle Boxelder Creek on June 30, 2004.

4. Measure aboveground water levels by bisecting the sub-populations (one permanent transect at each sub-population) at McIntosh Fen, and bisecting the Middle Fork Boxelder occurrence (one permanent transect). Transects need to extend into the dry area above where any surface water could be expected to expand. This monitoring needs to occur on the same calendar date from year to year.

Two permanent transects were installed at McIntosh Fen on May 20, 2004 and one transect was installed at Middle Fork Boxelder on June 30, 2004 and above ground water was recorded.

At the southern sub-population at McIntosh Fen, 9 points had measurable above-ground water out of a total 125 depth-point measurements collected along a total transect length of 109 meters. At the northern sub-population at McIntosh Fen, 3 points had measurable above-ground water out of a total 62 depth-point measurements collected along a total transect length of 61 meters.

At the Middle Boxelder Creek Exclosure site, 4 points had measurable above-ground water out of a total 38 depth-point measurements collected along a total transect length of 19.55 meters.

5. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Salix serissima*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

Cirsium arvense (Canada thistle) and *Cynoglossum officinale* (houndstongue) were recorded at McIntosh Fen in 2004. During the June 29, 2004 monitoring date, *C. arvense* was not documented to occur in the saturated conditions where *Salix serissima* is located, but was located nearby where the soil was not saturated. However, when the site was returned to on September 20, 2004, some *C. arvense* individuals were documented to occur within one meter of some of the *S. serissima* individuals.

No weeds were observed to co-occur with *Salix serissima* within the exclosure at the Middle Boxelder Creek occurrence. *Cirsium arvense* and *Cynoglossum officinale* were located nearby, but neither species are located among the *S. serissima* individuals or within the boggy portion of the fenced enclosure.

***Lycopodium complanatum* (Trailing Clubmoss)**



Photo by Forest Staff at *Lycopodium complanatum* site LYCO3-1, August 27, 2004.

Prior to the 2004 monitoring season, there were four known occurrences of *Lycopodium complanatum* located on Forest Service administered lands in the Black Hills identified with the following site numbers: (LYCO-1, LYCO-2, LYCO-3 and LYCO-4). Sites LYCO-3 and LYCO-4 were located in 2002. Site number LYCO-4 was reported in an area burned by the Grizzly Gulch wildfire (2002), and it is unknown what long-term effects the fire will have on the persistence of the species at this site.

The greatest risk identified to *Lycopodium complanatum* based on baseline data gathered from sites of LYCO-1, LYCO-2 and LYCO-3, is the small number and limited size of occurrences on Forest Service administered lands. There are currently no apparent or ongoing risks to the species at those locations, but those locations of this boreal remnant species are small enough that random events, such as drought or fire, could eradicate them. Although exotic, invasive plants are not currently an immediate risk to the species at those locations, there is potential for invasion because of their proximity.

The species is an evergreen and can be monitored at any time during the growing season (May to September) but is best observed in the spring or fall when overstory or other understory vegetative cover is low, but it is still possible to detect and identify any exotic plants known to be invasive. Efforts to monitor populations at sites have the potential to negatively impact the occurrence. The monitoring design has been modified to keep site disturbance at a minimum.

Monitoring Design and Information:

1. Monitor the following *Lycopodium complanatum* sites for presence/absence on an annual basis:

- LYCO3-1 (Sand Creek site),
- LYCO3-2 (Custer Crossing site)
- LYCO3-3 (Bear Butte Creek site)
- LYCO3-4 (Grizzly Gulch wildfire site)

***Lycopodium complanatum* was present at LYCO3-1 on August 27, 2004.**

***Lycopodium complanatum* was present at LYCO3-2 on August 23, 2004.**

***Lycopodium complanatum* was present at LYCO3-3 and LYCO3-4 on August 24, 2004.**

Although not part of the 2004 monitoring design for *Lycopodium complanatum*, baseline data were collected on

August 25, 2004 for three additional sites that were new 2004 reports for the species:

LYCO3-5 – (Tilson Creek west site)

LYCO3-6 – (Tilson Creek east site)

LYCO3-7 – (Buskala Creek site)

2. Install permanently placed PVC pipe along the edge of LYCO-1 at the easiest visual observation point. The PVC pipe will act as a visual linear transect dividing the site into segments. If 10 percent from any one of the segments is missing, then the rest of the site will be examined. This allows monitoring of the site with minimal human impact. If the extent declines by 10 percent or more, consult on a more rigorous design with the Rocky Mountain Research Station.

Visual estimated canopy cover range percentages of *Lycopodium complanatum* at LYCO3-1 in 2004 were:

Eastern most quadrant (Quadrant 1): 28 percent

Second quadrant from the east (Quadrant 2): 45 percent

Second quadrant from the west (Quadrant 3): 47 percent

Western most quadrant (Quadrant 4): 13 percent

Visual estimated canopy cover range percentages of *Lycopodium complanatum* at LYCO3-1 in 2003 were:

Eastern most quadrant (Quadrant 1): 42 - 52 percent

Second quadrant from the east (Quadrant 2): 65 - 72 percent

Second quadrant from the west (Quadrant 3): 45 - 52 percent

Western most quadrant (Quadrant 4): 15 - 20 percent

Monitoring by visual observations of canopy cover estimates for *Lycopodium complanatum* began in 2002. The canopy cover estimates at LYCO3-1 in 2002 were:

Eastern most quadrant (Quadrant 1): 50 percent

Second quadrant from the east (Quadrant 2): 75 percent

Second quadrant from the west (Quadrant 3): 75 percent

Western most quadrant (Quadrant 4): 20 percent

Decline in estimated cover percent of the quadrants is not associated with any documented evidence of dead plants or disturbance to the site. The percentage changes are expected to be related to issues with consistency of canopy cover estimates through changes in personnel who collect the data and site conditions that limit visibility of portions of the occurrence.

Based on what the Forest has learned regarding the canopy cover monitoring issue, plans are to consult with the Rocky Mountain Research Station on a refined monitoring design for the 2005 monitoring season.

3. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Lycopodium complanatum*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

No noxious weeds were observed to occur within any of the *Lycopodium complanatum* sites in 2004.

LYCO3-1 –*Tanacetum vulgare* (common tansy) was located in a different, more open canopy ecological type in the drainage below this *Lycopodium complanatum* occurrence.

LYCO3-2 –*Cirsium arvense* (Canada thistle) and *Cynoglossum officinale* (houndstongue) were located in a drier ecological pine type located upslope of the *Lycopodium complanatum* occurrence.

LYCO3-3 – *Cirsium arvense* and *Cynoglossum officinale* were located in a different ecological type in the drainage below this *Lycopodium complanatum* occurrence.

LYCO3-4 – *Cirsium arvense*, *Cynoglossum officinale* and *Leucanthemum vulgare* (ox-eye daisy) were located in a different ecological type in the drainage below this *Lycopodium complanatum* occurrence.

LYCO3-5 and LYCO3-6 – No noxious weeds observed near either of these sites.

LYCO3-6 – No noxious weeds observed near this site.

LYCO3-7 – No noxious weeds observed near this site.

***Platanthera orbiculata* (Large Roundleaf Orchid)**



**Photo by Forest Staff at *Platanthera orbiculata* site
PLOR4-19, July 13, 2004.**

Platanthera orbiculata is relatively secure in the Black Hills based on the large number of occurrences (greater than 30) distributed in three geographically separated regions on Black Hills National Forest administered land, each within a different geological type: 1) Bearlodge Mountains, 2) Northwestern Black Hills (contains the largest cluster of sites), and 3) Black Elk Wilderness. The species is present in patchy, scattered occurrences on shady, northwest to northeast facing slopes and draws in strong association with *Betula papyrifera* (paper birch)/ *Corylus cornuta* (hazelnut) and *Picea glauca* (white spruce) forests. The species persistence in the Black Hills is primarily limited by the small extent of cool, moist boreal habitat, although it appears to be secure on the forest at this time. Long-term droughts or dramatic climate changes characterized by drier and warmer conditions may present the greatest risk to the orchid and its habitat. Currently known occurrences are within grazing allotments, with the exceptions of locations in the Black Elk Wilderness. However risks to most of the occurrences from this use are generally low because many of the sites are on steep slopes with dense shrub vegetation, both of which deter livestock. Risks from other management activities (i.e., timber harvest) are generally low because known sites are subject to NEPA analysis and are avoided to the extent possible. No ongoing recreational impacts have been documented at the Black Elk Wilderness occurrences, in spite of the close proximity of an intensively used trail. Other potential

future risk factors could include plant collection and invasion by noxious weeds.

The most recent data available were used in designing monitoring for this species. Designated “core” orchid occurrences were identified using two criteria: geographic distribution of the occurrence and size (estimated number of individuals). Three occurrences from each of the three primary geographic areas listed above were designated as core occurrences for monitoring.

The monitoring was designed to assess the status of the nine core occurrences on an annual basis. The monitoring addresses three questions: 1) is the species present, 2) is there evidence of plant collecting, and 3) have noxious weeds and other exotic invasive species become established at the site? Although the proposed monitoring focuses on the presence or absence of a given occurrence, an estimated range of the number of individuals continues to be collected. If any of the core occurrences were not present, then the reason was to be documented if it could be determined and then to have randomly selected additional sites to serve as core sites.

The second aspect of the monitoring as currently designed was to provide baseline data on the persistence of the orchid during dry conditions. During a drought, the design includes monitoring three additional sites for presence/absence and to census the number of individuals during the first and second consecutive drought years. High numbers of orchids observed in 2000 potentially reflect several years of above average precipitation in the mid to late 1990s. The nine core sites and three other sites were monitored for presence or absence during the recent past drought years and a census was also taken during the second non-drought year following the dry period. Data on orchid population persistence and numbers in both wet and dry years are important for reassessing the species and for re-examining, and potentially changing the monitoring design.

Monitoring occurred on the additional drought year monitoring sites in 2002 and 2003 because these years were considered drought years. Declines were documented in 2002, and declines in numbers occurred to a much greater extent in 2003, with plant numbers dropping to less than 10 above-ground individuals on a number of sites. Because snow pack and precipitation for calendar year 2004 was considered “below normal”, there was a likelihood that *Platanthera orbiculata* individuals could be absent from a number of the known occurrence sites. Therefore, the Forest again elected to include drought-year monitoring for the 2004 monitoring season.

Monitoring of this plant is best conducted during the blooming period in late June to July. The plant is identifiable later in the season, and monitoring could take place in early August during a cool, moist year if a need arises. Plants with single leaves, two leaves, and plants with leaves and flowering stalks are counted as individual plants

Monitoring Design and Information:

1. Annually monitor presence/absence of known site locations in the Bearlodge Mountains: site numbers PLOR4-1, PLOR4-2 and PLOR4-3. If any of the key monitoring sites is not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e., drought, fire, noxious weeds).

***Platanthera orbiculata* was present at all three sites in 2004.**

2. Annually monitor presence/absence Black Elk Wilderness locations: site numbers PLOR4-23, PLOR4-24 and PLOR4-25. If any of the key monitoring sites is not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e., drought, fire, noxious weeds).

***Platanthera orbiculata* was present at all three sites in 2004.**

3. Annually monitor presence/absence of three key monitoring occurrence sites in the northwestern Black Hills: site numbers PLOR4-6, PLOR4-12, and PLOR4 -19. If any of the key monitoring occurrence sites is not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e., drought, fire, noxious weeds).

Platanthera orbiculata was present at all three sites in 2004.

Hardwood restoration activities occurred at site number PLOR4-6. The project decision date for this activity was 12-19-1996. The prescription was to remove approximately 15 square feet of basal area of conifers (*Pinus ponderosa*) and retain approximately 5 square feet of basal area. The prescription included retaining sixty square feet of aspen basal area at the site. Plants were still present within the general disturbance area, but it is unknown if activities directly affected any *Platanthera orbiculata* individuals. Numbers of *P. orbiculata* individuals in 2004 were relatively similar to numbers recorded in 2003. Survey of additional adjacent habitat resulted in a recorded expansion of the previously known boundaries of the *P. orbiculata* occurrence. Plants were located approximately 100 meters to the west of the previously known site boundary.

4. If drought occurs, monitor three additional sites: PLOR4-4, -21 and -22 (these sites were chosen for variation in geographic distribution). During the first drought year count individuals at all 12 sites. During the 2nd drought year, monitor all 12 sites for presence/absence. During the 2nd non-drought year, count individuals at all 12 sites. After the 2nd non-drought year reassess the monitoring plan to determine future needs.

The year 2004 was classified as a drought year in western South Dakota and northeastern Wyoming (see General Information at beginning of this monitoring report). *Platanthera orbiculata* was present at the additional drought monitoring sites: PLOR4-4, -21, -22. Individuals were counted at the 12 sites. Relative to 2000 data, 2004 counts were lower on eight sites and higher on four sites. For seven of the eight sites with declining numbers, we did not find evidence of disturbances that could have affected the number of individuals. However at site PLOR4-6 canopy and soil disturbances associated with hardwood restoration activities were documented.

***Platanthera orbiculata* Counts at Core Monitoring Sites During Varying Climatic Conditions**

Monitoring Years	2000	2003	2004
<i>Platanthera orbiculata</i> Site Numbers:	(Coming off a series of higher precipitation years)	(Drought year)	(Drought year)
PLOR4-1	44 (2001)	6	9
PLOR4-2	37	11	15
PLOR4-3	51	1	2
PLOR4-6	26	5	9
PLOR4-12	37	7	8
PLOR4-19	78	86	92
PLOR4-23	8	16	29
PLOR4-24	6	6	9
PLOR4-25	4	10	13
PLOR4-4	14	1	3
PLOR4-21	40	8	9
PLOR-22	1	1	3

***Sanguinaria canadensis* (Bloodroot)**



Photo by Forest Staff at *Sanguinaria canadensis* site SACA13-3, April 30, 2004.

Sanguinaria canadensis, occurring in the northern/northeastern Black Hills, is one of the most abundant R2 Sensitive Species on the Forest. There were 22 known occurrences of bloodroot on Black Hills National Forest lands at the time that a recent species assessment was written (completed 2003). Bloodroot occurs in hardwood forests, shrub thickets and floodplain habitats. The species is considered secure on the forest at this time, but due to limited potential habitat, and that a number of the sites have characteristics that lend themselves to invasion by noxious weeds and other invasive plants, weeds and their treatment have been identified as a risk to this species. The persistence of bloodroot on Forest Service administered land is not currently at risk from livestock grazing as nine sites are currently not grazed and one site is not accessible to livestock. Timber harvest is generally not deemed a persistence risk to bloodroot because occurrences are currently being avoided, mitigated or vegetative treatments may be designed to benefit the species. Collection (or illegal bloodroot harvest) is not currently an issue in the Black Hills but due to its value as a medicinal herb, harvesting could be detrimental.

The Forest has taken a conservative approach for this species and monitoring. Recent data available were used in developing monitoring guidelines for the Black Hills National Forest. “Core” bloodroot occurrences were selected using four criteria: size (estimated number of individuals), geographic distribution of the occurrence, potential risk from livestock grazing, and community type. Thus, the largest estimated number of individuals observed at a given site was a primary factor used in delineating potential core occurrences. To incorporate geographic distribution, sites widely distributed from one another were selected over sites in close proximity to other occurrences. Sites in allotments currently not being grazed were selected over sites grazed by livestock. Finally, the selection of core sites included at least one in each vegetative community type that is associated with bloodroot occurrences. Based on these criteria 10 core occurrences were selected. Of these 10 occurrences, 4 were designated as “key,” that is, occurrences of over 1,000 individuals deemed most critical to maintaining the bloodroot metapopulation on the Black Hills National Forest.

As in recent years the 2004 monitoring design involved assessing the status of the four “key” core occurrences. The monitoring was designed to address three questions: 1) is the species present, 2) is there evidence of plant collecting, and 3) have invasive plant species invaded the site? Although the monitoring focuses on the presence or absence of a given occurrence, a categorical estimate of each occurrence was also recorded.

The second aspect of the original monitoring design was to provide baseline data on the extent of bloodroot occurrences on all ten designated “core” sites and a reassessment of the status of each occurrence during a drought year. Our assumption was that the high numbers of plants observed in 2001 were partially the result of several years of above-average precipitation. By documenting the size and extent of bloodroot occurrences

during dry years we hope to have a better understanding of the role that precipitation levels play in the distribution and abundance of bloodroot. Any changes in the occurrence boundaries, evidence of plant collection or the presence of invasive or noxious plant species have been documented during follow-up surveys.

The third aspect of this monitoring guide is to assess any additional changes in the extent of bloodroot occurrences following a second consecutive dry, or below-average precipitation year. Information on the extent and change of bloodroot occurrences following two drought years is critical to consider in reassessing the current monitoring strategy. Information on the extent of occurrences in both wet and dry years is expected to provide valuable data for re-examining, and potentially changing the monitoring plan.

Key Monitoring Sites for *Sanguinaria canadensis*:

1. *S. canadensis* site # SACA13-1 (District number 99004; False Bottom site)
2. *S. canadensis* site # SACA13-2 (District numbers 99007 and 99008; Lost Gulch/Pillar Peak Allotment site)
3. *S. canadensis* site # SACA13-3 (District numbers 94011 and 94018; Meadow Creek site)
4. *S. canadensis* site # SACA13-14 (Park Creek site)

Core Monitoring Sites for *Sanguinaria canadensis*:

1. SACA13-4 (District number 93003)
2. SACA13-5 (District number 93004)
3. SACA13-6 (District number 95022)
4. SACA13-7 (District number 94BC1)
5. SACA13-9 (District number 93002)
6. SACA13-10 (District number 94BC3)

Monitoring Design and Information:

1. Annually monitor presence/absence of the four key sites. If relocated, gather baseline data and gather GPS data at the endpoints if the site is large (over ½ acre) or collect GPS points if the site is less than ½ acre.

***Sanguinaria canadensis* was present at all four key monitoring sites in 2004.**

2. During a drought year, collect GPS data of the endpoints of all “key” and “core” sites. If any key or core sites are absent, select another known site to monitor. During the second drought year and beyond, monitor presence/absence at all key and core sites. During the second non-drought year gather GPS data of the endpoints of all key and core sites. After the second non-drought year reassess the monitoring plan to determine future needs.

Core sites SACA13-4, -5, -6, -9 and -10 were monitored during 2004 and were present. GPS endpoints were collected.

Updated land ownership maps and database information revealed that SACA13-7 is located on private land. Therefore 2004 presence/absence data were gathered at two other Forest *Sanguinaria canadensis* locations: SACA13-19 and SACA13-21. Both sites were present and GPS data were collected.

Based on what the Forest has learned regarding SACA13-7, plans are to consult with the Rocky Mountain Research Station on whether or not another site should be selected as a core monitoring site for *Sanguinaria canadensis*.

3. Document any weeds designated as noxious by South Dakota or Wyoming at the key monitoring sites. Document if the weeds are co-located with *Sanguinaria canadensis*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

SACA13-1 –*Tanacetum vulgare* (common tansy), *Hypericum perforatum* (St. Johnswort), *Linaria vulgaris* (yellow toadflax) and *Cynoglossum officinale* (Houndstongue) were present at this site.

SACA13-2 –*Centaurea maculosa* (spotted knapweed), *Cynoglossum officinale* and *Tanacetum vulgare* were present at this site.

SACA13-3 – *Tanacetum vulgare* and *Cynoglossum officinale* were present at this site.

SACA13-14 - *Centaurea maculosa*, *Cynoglossum officinale*, and *Cirsium arvense* (Canada thistle) were present at this site.

4. Document any evidence of *Sanguinaria canadensis* collection at the four key monitoring sites.

There was no evidence of collection at any of the four key monitoring sites in 2004.

***Carex alopecoidea* (Foxtail Sedge)**



Photo by Forest Staff at *Carex alopecoidea* site CAAL8-18, August 2, 2004.

Based on recent confirmation (2000) of the identity of *Carex alopecoidea*, and that the species occurs on lands administered by the Black Hills National Forest, baseline data were gathered at occurrences in 2001. An estimate of linear extent, number of population patches and other baseline data were gathered at 14 known sites. With the likelihood that more occurrences of this species would be identified, and in consultation with the Rocky Mountain Research Station (January 2002), additional quick reconnaissance surveys were conducted in 2002 in similar habitat on the Bearlodge and Northern Hills Ranger Districts. Reconnaissance surveys resulted in 15 additional occurrences in the northwestern Black Hills and the Bearlodge Mountains. Similar reconnaissance surveys and project surveys in 2003 resulted in two new occurrences. Based on the number of occurrences located in the three preceding years, the Forest suspects that more occurrences are likely and this is reflected in the monitoring design.

Recent available data were used in developing monitoring guidelines for *Carex alopecoidea*. Occurrences for

monitoring were primarily selected on the following criteria: size (estimated number of individuals), geographic distribution of the occurrences, and if occurrences were located in different drainages. To incorporate geographic distribution, sites widely distributed from one another were selected over sites in close proximity to other occurrences. Based on these criteria, five occurrences were selected for a portion of the monitoring. Because of the recent number of occurrences located, the second aspect of the monitoring design is to continue reconnaissance surveys to continue to learn more about the species for future status assessments or to refine the monitoring design.

Monitoring Design and Information:

1. Annually count individuals at sites CAAL8-20/20A, -22, -30 and 31. Gather baseline data and assess risks at site CAAL8-16.

Only plants with reproductive structures present were counted. Therefore all counts are expected to be a conservative reflection as to the actual abundance of plants at the monitoring locations.

CAAL8-20 (combined CAAL-20/20A) - On August 4, 2004, 233 plants were counted. In 2003, 327 plants were counted.

CAAL8-22: On August 17, 2004, 1,003 plants counted. In 2003, 734 plants were counted.

CAAL8-30: On August 16, 2004, 576 plants were counted. In 2003, 349 plants were counted.

CAAL8-31: On August 12, 2004, 895 plants were counted. In 2003, 813 plants were counted.

CAAL8-16: Baseline data were collected.

2. Conduct quick reconnaissance surveys for *Carex alopecoidea* in similar habitat on the Bearlodge and Northern Hills Ranger Districts. If new sites are found gather GPS data to pinpoint the location.

No new sites were located during 2004 plant surveys.

3. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Carex alopecoidea*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

CAAL-16 – *Cynoglossum officinale* (Houndstongue) was present at this occurrence.

CAAL8-18 – *Cirsium arvense* (Canada thistle), *Cynoglossum officinale* (houndstongue), and *Carduus nutans* (musk thistle) were present at this site.

CAAL8-20 – *Cirsium arvense*, *Cynoglossum officinale*, and *Carduus nutans* are located nearby, but primarily occur slightly higher on the landscape (less moist soil conditions) than where the *Carex alopecoidea* individuals are occurring. *Linaria vulgare* (yellow toadflax) was found just north of the occurrence location.

CAAL8-22 – *Cirsium arvense*, *Carduus nutans*, *Cynoglossum officinale* and *Tanacetum vulgare* (common tansy) were present at this site.

CAAL8-30 – *Cirsium arvense* and *Cynoglossum officinale* were present at this site.

CAAL8-31 – *Cirsium arvense*, *Cynoglossum officinale* and *Tanacetum vulgare* were present at this site.

Species Added to the R2 Sensitive Species List in December 2003 or Recently Documented to Occur on the Black Hills National Forest

In general, as identified in the design, the main focus for the 2004 monitoring season was to attempt to relocate a number of the previously reported locations of the following species. Plans included the gathering of baseline data and assessing risks at occurrences that were relocated.

***Aquilegia brevistyla* (Small-flowered columbine)**



**Photo by Forest Staff at *Aquilegia brevistyla* site
AQBR-9, June 23, 2004.**

Aquilegia brevistyla was designated as a Region 2 Sensitive Species in December 2003. The species was reported to occur on all four ranger districts at more than 30 locations on the Black Hills National Forest. The species is widely dispersed geographically across the Black Hills and was under-reported because it had not been targeted for survey until recently, and because individuals are often scattered and do not bloom every year.

The species has been reported from a wide variety of habitats on the Black Hills: boreal communities, spruce forest, mesic drainage bottoms, dry streambeds, and moist limestone cliffs with some individuals occurring in moister riparian situations. Because of the broad ecological amplitude of this species, it is expected that there are many other areas, both on Forest lands and lands in other ownerships that have occurrences yet to be reported.

Aquilegia brevistyla can be distinguished from the other native columbine (red columbine, *Aquilegia canadensis*) when in flower, or with fruit. Baseline data collection in 2004 primarily occurred during June and July, when *A. brevistyla* was the most visible and identifiable through the flowering period.

Monitoring Design and Information:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations during the flowering period and gather baseline data on any relocated sites. Gather baseline data on new occurrences. Assess risks to those sites.

Baseline data were collected at 11 previously reported or newly discovered *Aquilegia brevistyla* sites in 2004. Baseline data were collected at site numbers: AQBR-7, AQBR-9, AQBR-12, AQBR-14, AQBR-15, AQBR-16,

AQBR-17, AQBR-18, AQBR-20, AQBR-21 and AQBR-43.

During surveys completed in 2004, 65 new locations for this species were reported.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Aquilegia brevistyla*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

AQBR-7, AQBR-9, AQBR-16, and AQBR-18 – No noxious weeds were present at these locations.

AQBR-12 – *Cynoglossum officinale* (houndstongue) and *Cirsium arvense* (Canada thistle) were present at this site.

AQBR-14 and AQBR-15 – *Cynoglossum officinale* was present at these sites.

AQBR-17 – *Cirsium arvense* was present at this site.

AQBR-20 – No noxious weeds are located at the occurrence site. *Cynoglossum officinale* was documented along an old roadbed located upslope of the site.

AQBR-21 – *Cirsium arvense* was present at this site.

AQBR-43 – No noxious weeds were located within the occurrence. *Cynoglossum officinale* was documented in a different ecological setting (grass dominated) located lower on the landscape.

***Botrychium multifidum* (Leathery grapefern)**



Photos by Forest Staff at *Botrychium multifidum* sites BOMU-7, October 1, 2004
and BOMU-2, September 9, 2004.

Botrychium multifidum was designated a Region 2 Sensitive Species in December 2003. The majority of occurrences on the Black Hills National Forest were discovered in 2003. Prior to the 2004 monitoring season there were seven known occurrences, all of which were located in the Norbeck Wildlife Preserve and Black Elk Wilderness. There are similar associated habitat conditions elsewhere in the Norbeck Wildlife Preserve

and within the Black Elk Wilderness, and probably within Custer State Park and the Mount Rushmore National Memorial; therefore it is likely that additional occurrences are located in the general area.

Monitoring Design and Information:

1. Attempt to relocate previously reported locations during the most identifiable time period of the season, approximately August or September, and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.

The seven previously reported locations from the Norbeck Wildlife Preserve and the Black Elk Wilderness were relocated and baseline data were collected. Four of the sites (BOMU-1, BOMU-2, BOMU-4 and BOMU-6) are located within one meter to 30 meters from hiking trails. There is potential that there could be risks associated with trampling or trail maintenance at those locations. Noxious weeds were located near a few sites (see the second portion of the monitoring design located below).

BOMU-1 (Lost Cabin Creek) – Located within the Black Elk Wilderness.

BOMU-2 (Harney Peak Trail) – Located within the Black Elk Wilderness.

BOMU-3 (Nelson Creek) – Located within the Norbeck Wildlife Preserve.

BOMU-4 (Iron Creek) – Located within the Norbeck Wildlife Preserve.

BOMU-5 (Iron Creek Tributary) – This occurrence is located within the Black Elk Wilderness.

BOMU-6 (Harney Peak Trail) – This occurrence is located within the Black Elk Wilderness.

BOMU-7 (Upper Iron Creek) – This occurrence is located within the Black Elk Wilderness.

In 2004 two attempts were made to relocate an unverified *Botrychium multifidum* report from Butcher Gulch. No *Botrychium multifidum* individuals were located.

No new locations of *Botrychium multifidum* were discovered in 2004.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Botrychium multifidum*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

No noxious weeds were observed in 2004 at BOMU-1, BOMU-3, BOMU-4, or BOMU-5.

BOMU-2 – *Cirsium arvense* (Canada thistle) was located within approximately 50 meters of the *Botrychium multifidum* occurrence.

BOMU-6 – *Cirsium arvense* was located approximately seven meters northeast of the occurrence.

BOMU-7 – *Cirsium arvense* was documented from 5 to 40 meters from *Botrychium multifidum* individuals.

***Botrychium lineare* (Narrowleaf Grapefern/Slender Moonwort)**



Photo by Forest Staff at *Botrychium lineare* site BOLI7-1, June 7, 2004.

Botrychium lineare was recently determined (December 2003) to occur on the Black Hills at a single location on the Bearlodge Ranger District in Wyoming.

Baseline data were gathered at the site in 2003. As with other *Botrychium* species dry conditions are expected to limit the emergence of aboveground stems and the individuals may not emerge during a succession of dry or drought years. Plants were located on June 19, 2003 and periodic return visits during the following weeks documented that the plants wither soon after the spores are released. Based on a single year of data and spring conditions, the site was returned to in early June 2004.

Monitoring Design and Information:

1. Continue to gather annual baseline data at the recently documented 2003 occurrence from the Bearlodge Ranger District. Gather baseline data on any new occurrences that may be located. Assess risks to those sites.

Baseline data were collected on June 7, 2004. An expansion of the previously known site boundary was documented, and plants were documented to occur further to the north. Four sub-populations were documented to occur over approximately ¼ mile.

Through discussions with Dr. Donald Farrar at the 2004 monitoring of this site, potential risks to this species at this location could include succession of the site to progress to a later vegetative successional stage, something that would result to changed hydrology of the site, noxious weed invasion or alterations from the amounts of the currently low-level disturbances that now exist at the site.

No new *Botrychium lineare* occurrences were discovered during 2004.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Botrychium lineare* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

No weeds were documented at any of the sub-populations for this occurrence. However, *Cynoglossum officinale* (houndstongue) and *Tanacetum vulgare* (common tansy) were observed to occur in the same ecological type, approximately 100 meters to the south of the occurrence location.

***Carex leptalea* (Bristle-stalk sedge)**



Photo by Forest Staff at *Carex leptalea* site CALE10-15, July 7, 2004.

Carex leptalea was designated as a Region 2 Sensitive Species in December 2003. Prior to the 2004 monitoring season more than 35 sites had been reported on the lands administered by the Black Hills National Forest. Past reports indicated that the species was associated with bogs and marshy areas as well as streams. The species is widely dispersed geographically across the Black Hills and was thought to be under-reported because it had not been targeted for survey until recently years.

Carex leptalea is most identifiable from mid-July to September.

Monitoring Design and Information:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations during the most identifiable time period of the season, usually mid-July to late August, and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.

During the 2004 monitoring season, baseline data were collected for ten *Carex leptalea* occurrences. These sites were a combination of previously reported and new 2004 reported locations.

During the 2004 survey season, 24 new *Carex leptalea* sites were reported on lands administered by the Black Hills National Forest.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Carex leptalea*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

CALE10-9 – *Cirsium arvense* (Canada thistle) and *Cynoglossum officinale* (houndstongue) were present at this site.

CALE10-12 – *Cirsium arvense* was present at this site.

CALE10-13 – No noxious weeds were present at this site.

CALE10-14 – *Cirsium arvense* was present at the site. *Cynoglossum officinale* was not present within the site, but was observed in the drainage bottom located below the slope on which *Carex leptalea* occurs.

CALE10-15 – *Cirsium arvense* was present at this site.

CALE10-16 – *Cirsium arvense* was present in the general area.

CALE10-17 – No noxious weeds were present at this site.

CALE10-18 – *Cirsium arvense* was observed approximately ten meters to the south of the *Carex leptalea* individuals.

CALE10-19 – *Cirsium arvense* was located along the edges of the saturated areas, but was not located in among *Carex leptalea* individuals.

CALE10-20 – No noxious weeds were present at this site.

Cypripedium parviflorum (Yellow ladyslipper)

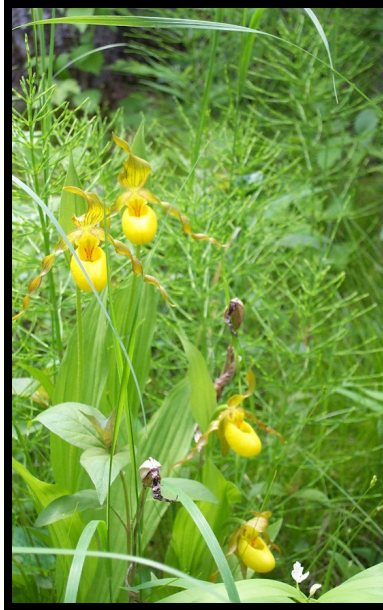


Photo by Forest Staff at *Cypripedium parviflorum* site CYPA19-7, June 21, 2004.

Cypripedium parviflorum was designated as a Region 2 Sensitive Species in December 2003. A minimum of 50 occurrences are located on the Black Hills. Based on a recent assessment and some recent evaluations completed for this species, the total number of sites reported varies widely from greater than 50 to approximately 100 occurrences. The number of occurrences is based on historic reports and how sites have been documented in the field. It may be that a number of adjacent smaller sites are actually portions of larger occurrences.

Reports prior to the 2004 monitoring season indicate that the species is primarily associated with mesic conditions on limestone rock outcrop areas, often on north-facing slopes, and on mesic to saturated conditions in and adjacent to riparian areas. The species is widely dispersed geographically across the northern and central Black Hills and is likely under-reported because it has not been targeted for survey until recently.

Cypripedium parviflorum is easily identifiable during the flowering period. Plants flower as early as late May at lower elevations, and in early July at higher elevations. Seed structures and leaves can also be used to identify this species, primarily during July and August.

Monitoring Design and Information:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations during the most identifiable (flowering) time period of the season and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.

Baseline data were collected for seven sites. These sites were a combination of previously reported sites or new 2004 reported locations.

Ten new *Cypripedium parviflorum* occurrences were discovered during surveys completed on the Black Hills National Forest in 2004.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Cypripedium parviflorum*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

CYPA19-6 – *Cynoglossum officinale* (houndstongue) and *Cirsium arvense* (Canada thistle) were present at this site.

CYPA19-7 – *Cirsium arvense* was present at this site. *Cynoglossum officinale* was not present at the *Cypripedium parviflorum* site, but individuals were located in the bottom of a nearby drainage.

CYPA19-8 – *Cirsium arvense* was present at this site.

CYPA19-9 – *Cirsium arvense* was not present at the site but it was observed in the bottom of a nearby drainage.

CYPA19-10 and CYPA19-11 – No noxious weeds were present at these sites.

CYPA19-12 – *Cynoglossum officinale* was not present at this site, but was present in a drainage located lower in the watershed.

***Salix candida* (Hoary willow)**



Photo by Forest Staff at *Salix candida* site SACA4-1, May 17, 2004.

Salix candida was designated as a Region 2 Sensitive Species in December 2003. *S. candida* is currently

known from the McIntosh Fen Botanical Area. The persistence of this species in the Black Hills is dependent on conserving this single occurrence.

A recent species assessment (2003) has been completed and recent baseline data (2002 and 2003) have been collected for *Salix candida*. An obligate wetland species, the primary risk to its persistence and reproductive success is any lowering of the water table where it occurs, whether it is natural or human-induced. Noxious weeds or insect infestations have been identified as potential risks for this species. *Cirsium arvense* (Canada thistle) currently occurs within the McIntosh Fen Botanical Area, although high soil moisture levels in the fen itself appear to exclude Canada thistle from the *S. candida* habitat. *Lythrum salicaria* (purple loosestrife) is not known to occur at McIntosh Fen, or anywhere close by, but is very aggressive and has the potential to out compete riparian natives, including *Salix candida*. No insect infestations have been documented, but other *Salix* species in the Black Hills have been infested with stem borers. Fishing occurs along Castle Creek (near the fen) in the McIntosh Fen Botanical Area, and a designated snowmobile trail crosses the Botanical Area but does not extend into either of the two sub-populations of the *Salix candida* occurrence. Prior to the 2004 monitoring season, no impacts had been documented to the willow from either activity. Although no impacts have been documented from wildlife use or trespass cattle, both could be a potential risk at the site.

Monitoring design is similar to that for *Salix serissima* to attempt to detect and respond in a timely manner to changes in extent and condition of *Salix candida* and its habitat. The protocol focuses on annually monitoring: 1) the extent of the population, 2) total number of individuals and number of reproductive plants, 3) number of plants infected by any damaging agents (i.e., insects), 4) water table level, and 5) presence of exotic invasive plant species.

As specified, the monitoring of *Salix candida* occurred in May of 2004 during the blooming period so that the total number of reproductive individuals could be determined.

Monitoring Design and Information:

On an annual basis at the *Salix candida* site:

1. GPS new endpoints if site boundaries are expanded.

Comparison of site boundary data collected on May 20, 2004 to data collected in 2003 does not reveal any expansion or contraction of the boundaries.

2. Count individuals during the blooming period (documenting total number of individuals, and total reproductive individuals). If the number of individuals declines by more than 10 percent, consult on a more rigorous design with the Rocky Mountain Research Station.

It is difficult to count individuals at this location because some areas of the occurrence are very dense and individuals are hard to distinguish. There were 1,351 individuals of *Salix candida* counted in 2004. There were 734 individuals of *Salix candida* counted in 2003.

Based on what the Forest has learned about the difficulty of counting individuals in the high density areas of this occurrence, plans are to consult with the Rocky Mountain Research Station on a refined monitoring design for the 2005 season.

3. Document the number of plants infected with any damaging agents (i.e., willow stem borer).

No damaging agents were documented.

4. Measure aboveground water levels using transects used for *Salix serissima*.

Two permanent transects were installed at McIntosh Fen on May 20, 2004. At the southern transect, 9 points had measurable above-ground water out of a total 125 depth-point measurements collected along a total transect length of 109 meters. At the northern transect, 3 points had measurable above-ground water out of a total 62 depth-point measurements collected along a total transect length of 61 meters.

5. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Salix candida*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

Cirsium arvense (Canada thistle) was the only noxious weed species observed at McIntosh Fen on May 20, 2004. In September *Cirsium arvense* was observed to occur near the willows monitored at this location.

***Viburnum opulus var. americana* (Highbush cranberry)**



Photo by Forest Staff at *Viburnum opulus var. americana* site VIOPA2-12, July 22, 2004.

Prior to the 2004 season, there were more than 30 occurrences of this shrub reported on the Black Hills National Forest. Approximately 80 percent of the Black Hills National Forest occurrences were reported in 2002 and 2003. Known locations are geographically dispersed and are located in at least ten sixth level watersheds in the Northern Hills in South Dakota and Wyoming (Lawrence, Meade, Pennington and Crook Counties). There are reports of this species from private land in the Black Hills. Van Bruggen (1996) stated that this shrub was frequent in rich wooded ravines in the Black Hills. This shrub species is often intermingled with a number of other shrub species in dense thickets. Unless the species is specifically targeted during surveys there are times when it would likely not be noticed within high density shrub thickets. Many thickets are so dense that they are basically impenetrable and it is likely that the number of individuals reported at occurrences is a conservative number.

Monitoring Design and Information:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations when the plant is most identifiable (during the flowering period) and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.

During the 2004 monitoring season, baseline data were collected for six *Viburnum opulus var. americana* occurrences. These sites were a combination of previously reported and new 2004 reported locations.

Insect predation (holes in leaves) was documented at three of the six sites where data was gathered in July 2004.

Insect predation was not observed on those sites that were monitored in May or June.

Recreational vehicle use and livestock activities were noted near a few of the six occurrences where data was gathered. At these locations, no direct disturbances were noted at the specific location of *Viburnum opulus* var. *americana* individuals.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with, *Viburnum opulus* var. *americana* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

VIOPA2-9, VIOPA2-11 and VIOPA2-14 – No noxious weeds were present at these locations.

VIOPA2-8 – *Cirsium arvense* (Canada thistle) was present at the site. *Cynoglossum officinale* (houndstongue) is located within a nearby drainage bottom.

VIOPA2-12 – No weeds were present at the site. *Cynoglossum officinale* was located within a nearby drainage bottom.

VIOPA2-13 – *Cynoglossum officinale* was present at this site.

Monitoring Item 20: Insects And Diseases - Population, Damage Trend, and Hazard

20a: Susceptibility of Ponderosa Pine Stands to MPB Infestation

Objectives:

228. Within planning units (diversity unit, watershed and/or landscape association) where outbreaks of mountain pine beetle could threaten management objectives for ponderosa pine (especially where timber production is desired), maintain or reduce acreage of ponderosa pine stands that are in medium or high risk condition for infestation.
229. Using analyses of insect and disease populations, determine where suppression strategies are needed to meet management objectives and minimize value loss of tree vegetation affected by outbreaks of insect and disease pests.

Monitoring:

Stands in the Black Hills can be hazard rated for mountain pine beetle (MPB). The most current and well-tested system is based on Schmid et al. 1994. In this system, each stand is rated based on average diameter and stand density. Stands that have an average diameter of less than 7.0 inches are rated as low hazard. Stands that have an average diameter of greater than 7.0 inches are then sorted based on density. All Forestwide stands were rated using data from the Resource Information System (RIS) database available in 2000 for this year's report. This data indicated there were 1,040,000 acres of susceptible type (ponderosa pine) on the

Forest.

Hazard Rating	Density	Acres	Percent of Area
Low	< 80 BA	610,340	59%
Moderate	80-120 BA	333,320	32%
High	120 BA	96,340	9%

Note: the forest plan amendment (Phase II) is a relative rating scheme based on structural stages and is different than the rating system shown here. Data will be different in future reports.

Some of the missing data is from stands within the Jasper fire area. Most of the areas in question were burned at a high intensity, so it is likely these all fall into the low category for mountain pine beetle. Low basal areas caused most of the stands to be rated as low risk, a factor that can change significantly in 15 to 20 years. This is an increase in the moderate category and a decrease in the high category as compared to the 1995 database numbers.

The recent fires across the forest will lower mountain-pine-beetle hazard in these areas; however they can lead to an expansion of pine engraver and wood borer populations. Populations of pine engraver are killing green trees in larger numbers than has been seen in recent history. This is due in part to creation of large areas of habitat by fires and is being magnified by less than average moisture totals over the past few years. Woodborer populations are also at high levels. Any trees killed are being rapidly attacked and infested by borers. Prompt salvage of dead trees is needed as these insects are degrading lumber value quickly in killed trees. A study of beetle use of fire areas in the Black Hills is continuing. In addition areas that have experienced heavy MPB mortality over the past few years, such as Beaver Park, may no longer have enough live host material to sustain MPB populations. However beetles are spreading out from these areas and infesting nearby stands.

In areas where beetle activity was increasing and stands were harvested as part of a timber sale, beetle activity has dropped. Timber sales and other commercial contracts are the most financially efficient method of treating a landscape because the tree value supplements available funding.

Evaluation:

MPB infestations are continuing to spread along with those of other insects. The Forest's ability to manage for reduced insect risk can be limited by funding, the time it takes to set up a timber sale or other treatment project, legal considerations (NEPA process), and contract length. The situation is improving with increased funding, changes in legal and policy requirements, and industry cooperation.

Objective 229:

Evaluations have led to suppression projects being undertaken in campgrounds, Beaver Park, Warren Peak, Bear Mountain, Coulsen and Deerfield.

An aerial survey was conducted in July 2004 to estimate damage levels caused by bark beetles, MPB, and Ips on ponderosa pine. There were about 232,000 trees killed by bark beetles in 2003 that showed up as red faders in the survey. This number is less than what was found in 2003; however there is concern that the timing of flight being earlier in the year (July vs. August) caused the number to be underestimated as not all trees had faded yet.

A long-term study has been initiated to examine the flight periods and most effective lure chemistry of adult mountain pine beetle and pine engraver beetle. Presently we have identified some different monoterpenes as being somewhat more effective as an attractant. We are looking at dose rates and interactions with other

chemicals to find the most effective mixture possible.

On-the-ground surveys are being conducted to estimate the level of infestations and how they have changed over the past three years.

20b: Pine Beetle Levels and Trends

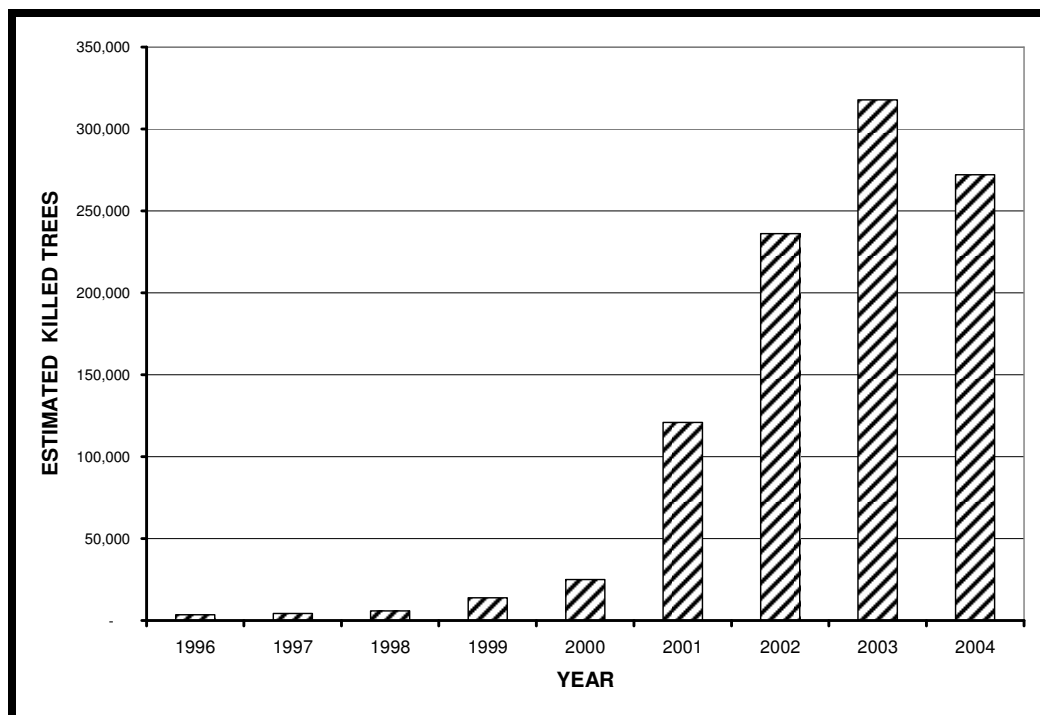
Monitoring:

An aerial survey was conducted in July 2004 to estimate damage levels caused by bark beetles, mountain pine beetle (MPB), and *Ips* on ponderosa pine. The survey indicated that there were 232,000 trees killed by bark beetles in the Black Hills, amounting to an estimate of almost 4.6 million cubic feet of volume lost. The largest outbreak in the Black Hills occurred from about 1890 to 1908, with mortality estimated at close to one million trees killed per year at the peak of the outbreak. The next largest outbreak occurred in the 1970s with peak mortality numbers of around 600,000 trees killed in a single year. Many of the areas that have been infested are being treated. This should help bring about a decline in tree mortality. Large areas of concentrated mortality were detected in Beaver Park, Vanocker Canyon, Kirk Hill, areas south and west of Bear Mountain, around the Ditch Creek area, areas west of Deerfield, Warren Peak, and the Boles Canyon area.

Evaluation:

When the mortality from mountain pine beetle and fires is added to the general background mortality from root disease and other sources, a considerable amount of mortality has occurred across the Forest over the past few years. A primary contributor to mortality is drought related.

Figure 1. Running three-year averages of estimated ponderosa-pine mortality due to mountain pine beetle from 1996 to 2004, based on aerial surveys over the entire Black Hills of South Dakota and Wyoming.



20c: Insect and Disease Evaluations

Monitoring:

Biological evaluations of mountain-pine-beetle-caused mortality were conducted in the Beaver Park, Deerfield, Bugtown Gulch, and Warren Peak areas. These evaluations consisted of ground surveys to estimate the level of infestations and how they have changed over the past three years. Based on the ground surveys, beetle-caused mortality is increasing at Beaver Park, Deerfield and Bugtown Gulch, with both Deerfield and Bugtown Gulch showing some dramatic increases. The increases in the Beaver Park area are now occurring in areas surrounding the original Beaver Park roadless area. Much of the roadless area has been treated or killed by beetles, although there are still some significant spots of beetle mortality in the area. Beetle populations are static at Warren Peak. Beetle populations seem to be increasing at roughly a two fold rate in the areas where an increase is noted.

A long-term study has been initiated to examine the flight periods and most effective lure chemistry of adult mountain pine beetle and pine engraver beetle. Baited funnel traps were checked weekly throughout July and August 2004 to determine when the beetles began flying and when they stopped. This study will take several years to account for the year-to-year variation in flight periods caused by environmental factors. Other studies are looking at alternative control measures for mountain pine beetle. Testing the effectiveness of different preventative sprays against mountain pine beetle is ongoing. Two chemicals tested are effective, depending on dose, at protecting trees from attack for one season, and one may be effective for two seasons. These insecticides are effective for treating individual trees in isolated areas but are not practical for widespread use. Some of these chemicals may not be available for forestry uses in the near future, so there is a continued need for further evaluation of suitable replacement chemicals.

Initial findings in the study of fire and subsequent insect infestations indicate that the majority of dead ponderosa-pine trees sustained >75 percent crown damage (crown scorch + crown consumption). Of the areas being studied the Black Hills had the highest rate of primary bark-beetle infestation (generally Ips) at better than 51 percent of the trees infested. The majority of trees infested were those that had 75 percent or greater crown damage.

Other Insects and Diseases Of Interest:

Red Turpentine Beetle and Wood Borers.

Activity of red turpentine beetle (*Dendroctonus valens*) appears to be going down. There was less incidence of this insect noted in 2004, although there are still some areas, particularly recent burns, which still have a fairly high level. Wood boring insects (beetles in the families *Cerambycidae* and *Buprestidae*) are still present in large numbers in burned areas and in mountain-pine-beetle-killed trees.

Boring insects play a large role in lumber quality. Since these insects actually bore into the wood of a tree as opposed to just living under the bark as do bark beetles, they cause serious degradation of lumber after they have attacked a tree. Over the past few years trees have died and become infested with borers so rapidly that in some cases, the trees did not hold lumber value for more than two to three months after they were killed.

Armillaria Root Disease:

Armillaria root disease is common throughout the Black Hills on all tree species found here, conifers and hardwoods alike. Typically, it is not considered a killer of large trees; however it does kill seedlings and saplings regularly. In larger trees it acts more to reduce growth rates and stress the trees, which can make them more susceptible to bark-beetle attack. In the general forest it can be found almost anywhere. However it is apparent that there are root disease centers or places where it may be more of a problem. Known areas of greater *Armillaria* activity or root disease centers include the Bearlodge Mountains, Medicine Mountain, and generally, the Limestone Plateau. *Armillaria* is a concern in areas that have experienced fires as the large quantity of weakened trees may lead to an increase in these areas. *Armillaria* could kill some trees that may

have otherwise survived. A series of plots were established in the Jasper fire area to look at how *Armillaria* responds to wildland fire.

Overall the above factors generally do not lead to large-scale tree mortality; however conditions on the Forest over the past few years have led to concerns.

Evaluation:

Effective and economical pheromone or chemical treatments for widespread use on the Forest to reduce or eliminate pests have not been found. Some existing chemical methods that protect individual high-value trees may no longer be legal to use on the Forest in the future. The forest is currently experiencing large population increases in mountain pine beetle, pine engraver, and wood borers. Whether or not *Armillaria* is expanding in burned areas is unknown at this time. These mortality agents play a role in creating snags and providing other benefits for wildlife. They also can significantly change the look and function of the forest at a landscape level. What is apparent is that there are major changes taking place across the landscape of the Black Hills.

Monitoring Item 21: Exotics

Objective 230. Eradicate or limit spread (acres) of new introductions of non-native pests (insects, diseases, plants) to minimize ecosystem disruption.

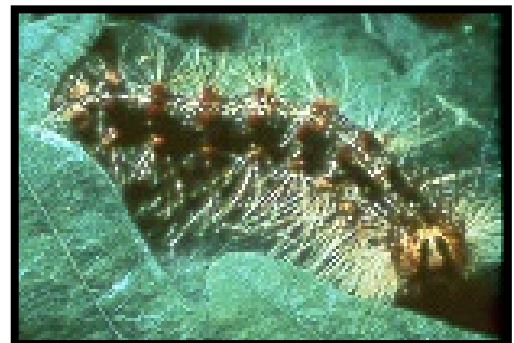
Monitoring:

Gypsy Moth

Detection surveys for the gypsy moth were continued at recreation and administrative sites on the Forest in 2004. No moths were caught in recreation sites on the National Forest. It is assumed that most of these are transient and there is no local population established at this time. See also Monitoring Item 19 noxious weeds.



Gypsy moth eggs



Gypsy moth larvae



Gypsy moth adult

Evaluation:

Gypsy moth has not been a problem on the Black Hills National Forest. The need for continued monitoring of this introduced pest is warranted. *S. schevyrewi* is a bark beetle that was found for the first time last year, including in areas surrounding the Black Hills. Its main hosts are elms; however it is reported to attack Russian olive, willows, and many stone fruit trees. Whether it would be a concern on the Forest or not is questionable.

Monitoring Item 22: Fuel Loading Hazard

Objective: 224. Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area, using the criteria in Forestwide Standard 4110.

Monitoring:

The combination of all fuels influencing activities accounted for an estimated 245,000 tons of 3 inch and less diameter fuel residue being treated in accordance with Forest Plan required treatment standards.

All activities which generate fuels (reference Monitoring Item 23: FIRE - Fuel Treatment) require an assessment to determine appropriate fuel treatment as outlined by Land and Resource Management Plan (LRMP) Guideline 4110 (page II-55, LRMP). This assessment and prescribed treatment insure that on-site fuel hazards either remain at pretreatment levels or are reduced as necessary based on risk and/or values present.

Of the 36,477 acres of fuel reduction activities (see Chart - Monitoring Item 23), nearly 70 percent of it occurred in areas identified in the Black Hills National Forest Fire Protection Assessment (FPA) as having a high hazard index. Prescribed treatments in these areas reduced the hazard index to moderate or low levels. Less than five percent of fuel-treatment activities occurred on areas of the Forest where the FPA rated existing fuel “hazards” low. Fuel treatment on the balance of the activity acres occurred on areas identified by the FPA

as having a moderate hazard index. Prescribed treatment in these areas either reduced the hazard index or resulted in no change to the hazard index based on the fire "risk" or "values" present. Continuing drought conditions persisted over the Forest in 2004; however wildland fire activity was below the Forest average due to efficient suppression action, reduced lightening activity and timely precipitation events. In all, 143 acres of the Forest burned. This acreage was not significant in terms of change within fuel hazard ratings in the burned over areas. Based on the combined effects of fuel treatment and wildland fire activity, an estimated 25,634 acres of the Forest moved from a high-hazard index to a moderate or lower-hazard fuel profile. In addition, approximately 10,986 acres of the Forest moved from a moderate-to-low or remained at a low-hazard fuel index. In any given year, untreated or unburned areas of the Forest currently rated as being in a moderate fuel-loading index will move into a high-hazard rating due to natural fuel deposition. However, the net decrease of high-hazard fuel acres on the Forest as a direct result of wildfire and management activities in 2004 is estimated at approximately 7,434 acres.

High Hazard Acres

LRMP Baseline (Decade 1)	LRMP Baseline (Decade 2)	1999	2000	2001	2002	2003	2004
580,434	519,274	547,744	489,244	476,744	466,344	455,444	448,010

Evaluation:

The Forest has reduced high fire-hazard acres from 580,434 acres to 448,010 acres, an approximate 23 percent reduction in 7 years. The Forest is not meeting prescribed burning objectives because of funding limitations, limited days when the weather is favorable for maintaining control of prescribed burn, smoke dispersal is acceptable, and due to wildland fire acreage.

Accomplished (Acres)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004
Objective 227: Fuel-treatment Activities	28,029	28,475	25,598	26,288	29,214	36,477
Objective 223: Prescribed Fire Activities	1,830	2,600	900	1,433	3,481	6,807

Monitoring Item 23: Fuel Treatment

Objectives:

- 223. Use management ignited fires and prescribed natural fires to achieve desirable vegetative diversity and fuel profiles on 8,000 acres per year for the next decade. Use natural fire on a limited basis under specifically prescribed conditions.**
- 224. Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area, using the criteria in Forestwide Standard 4110.**
- 227. Manage 28,900 acres of activity fuels and 4,000 acres of natural fuels each year during the next decade,**

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consistent with the need to protect life, property and natural resources from the threat of wildfire. This acreage includes acres specified in Objective 223.

Monitoring:

The Forest accomplished fuel-treatment-related activities on a total of 36,477 acres of the National Forest in FY2004. Included in this work were activities as listed below:

Fuel Treatments (Measured in Acres)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004
Pile Creation:	595	1,056	879	1,233	1,269	3,609
Pile Burning:						
Natural Fuels	262	855	58	2,247	1,598	532
Activity Fuels	1,430	1,116	1,444	303	500	734
Prescribed Burning	1,830	2,600	1,073	1,433	3,481	6,807
Slash Removal	76	47	1,824	90	190	1,089
Urban Interface Thinning and Piling	111	560	3,718	15	103	575
Lop/Scatter/Chip/Crush (force account)	1,687	1,456	25	692	6,464	5,632
Pine Encroachment and Disposal	1,220	431	675	579	714	489
Pre-commercial Thinning and Associated Fuel Treatment	4,579	7,003	3,095	3,902	5,286	6,815
Aspen Regeneration	520	409	131	97	79	88
Purchaser Contribution - Lop and Scatter/Removal/Mech. Crush	6,027	12,967	12,515	15,697	9,331	10,061
Fuel Break Construction - associated with and included in the above acres	524	384	161	0	199	46

(See 2004 Forest Summary Silva Report as extracted from Rocky Mountain Resource Information System [RMRIS] database and NFPORS 2004 Summary).

Much of the above acreage is associated with the Forest's active timber sale program.

Evaluation:

The Forest has accomplished the following:

- 126 percent (36,477) of all activities fuels treatment projected in the 1997 Plan (28,900 acres/year).
- 85 percent (6,807 acres) of management ignited prescribed fire fuel treatments projected in the 1997 Plan (8,000 acres/year).
- 167 percent (6,696 acres) of natural fuel treatments projected in the 1997 Plan (4,000 acres/year).

Monitoring Item 24: Fire - Prevention and Suppression

24a: Suppression

Objective 225. Manage wildfires using the appropriate suppression response (confine, contain or control) based on management area emphasis, existing values, risk of ignition and fuel hazards within a given area.

Monitoring:

The Black Hills National Forest experienced a near average fire occurrence year in 2004; however acreage burned was well below the 40 year average. There were 122 fires during the 2004 fire season which was below the Forest average of 139. There were 94 lightning and 28 human caused fires. Both ignition sources were below the respective annual norms of 101 and 38.

The drought conditions of the previous four years continued through 2004 causing some control problems during initial attack suppression activities; however timely precipitation contributed to initial attack success. In all, 143 acres of the Forest burned in 2004. While fire and fire related issues continued to dominate the Forest scene in 2004 there was only one escaped fire on the Forest. The lightning started Bennett Canyon fire of July 31 burned 65 acres to the north and west of Edgemont South Dakota. All burned acres were on the National Forest. Since the fire burned in a relatively remote location there were no urban interface issues. Resource losses were minimal due to low or marginal valued timber resources that exist in this area of the Forest.

The Forest completed a revision of its National Fire Management Analysis System (NFMAS) data in 1999. That revised analysis and associated fire modeling places projected annual losses at 3,253 acres with a suppression budget funded at the Most Efficient Funding Level (MEL). The suppression program for FY2004 was funded at approximately 80 percent of the revised MEL budget level (includes total program spending authority). Recorded acre and resource value losses in 2004 were significantly below the norm and also below the NFMAS projections and were considered well within the statistical variation of historical fire records/data. All fire reports have been submitted and entered into the FIRESTAT Database at Kansas City.

Evaluation:

All wildfires on the Black Hills National Forest in 2004 were suppressed through appropriate suppression responses in accordance with management area emphasis, existing values, and fuel hazards within the incident area.

Confined: All

Contained: All

Controlled: All

24b: Prevention

Objective 226. Develop fuel management and protection strategies for intermixed land ownerships in partnership with private, state and other federal agencies.

Monitoring:

Indicators: Interagency involvement and or assessment of the following items:

- Status of fire management agreements with partner agencies;

All cooperator agreements and annual operating plans were reviewed and signed as required in 2004 with the exception of the annual operating plan with the State of South Dakota, which tiers to the state and Federal interagency cooperative fire agreement. An annual operating plan with the State of South Dakota was not signed in 2004. An annual operating plan is currently being jointly drafted and it is anticipated that it will be signed for the 2005 season based on much improved relations among all cooperators that developed over the course of the 2004 fire season.

- Involvement in interagency fire training exercises;

The Forest continues to play a lead role in interagency fire training by providing qualified instructors, financial support, and course coordination for much of the fire training offered in the Black Hills and surrounding areas each year.

Agencies cooperated in hosting one large basic fire school (S-190, 130, etc.) session in 2004. This session was held at the Western Dakota Vocational Technical Institute (Institute) located at Rapid City, SD. The Institute provided classrooms, student registration, and all administrative coordination of the training while various Federal, state and local cooperators provided instructors. The Institute has elected to be a partner in this annual fire training in the Black Hills and we are looking forward to utilizing their facility for future training initiatives. They are also developing an Associate Degree Fire Science Program at the Institute with a projected startup date of September 2005. This program is being developed through an interagency advisory board with the Forest Service as an integral player. All fireline personnel on the Forest were appropriately tested for fireline duty based on their position requirements; all received fireline refresher training; and all attended fatigue awareness training.

- Involvement in South Dakota Interagency Fire Council (SDIFC) meetings and other interagency activities;

The Forest is a member of the SDIFC and an ad hoc member of the Black Hills Fire Advisory Board (BHFAB). Both of these organizations provide interagency coordination of prevention, pre-suppression, and suppression activities in the Black Hills and surrounding areas. The Forest has representation at all meetings and participates in and provides representation to various committees and task groups of these two active organizations.

- Effectiveness of the Northern Great Plains Interagency Dispatch Center (GPC) at Rapid City Regional Airport as assessed by fire management partners;

The year 2004 saw the first full year of operation of the newly established GPC located at Rapid City Regional Airport. The GPC continued to improve on the progress made during its first season of operation in 2003. Successes included development of standard operating procedures for interagency communication, initial attack and move up, multi-agency coordination protocol including standard coordination protocol with area 911 dispatch centers. The GPC continues to improve services in meeting the demands of increasing expectations of the many cooperators.

The Forest fire management officer (FMO) was the chairperson of the GPC board of directors and attended all board meetings.

The GPC manager and staff performed exceedingly well given all the challenges they faced during the year.

- Assessment of suppression support afforded partners through Incident Command System (ICS) process and as might be identified through post fire reviews, reports, or exit conferences; and
- All other information, which might cast light on the Forest's record of performance related to efficiency of operation in the fire management arena through interagency cooperation and prevention activities.

The Forest completed reviews of various fire incidents during the course of the 2004 fire season in compliance with findings and abatement requirements of the Thirty-Mile incident.

The only escaped fire on the Black Hills (Bennett Canyon in July) was managed with a local Type III incident management team. The team was composed of individuals from several agencies and performed admirably in a spirit of cooperation.

Evaluation:

The Forest has extensively cooperated with private, state, and other Federal agencies to develop joint fuel management and protection strategies for intermixed landownership in partnership with private, state, and other Federal agencies and was proactively involved in development of community fire plans during 2004.

Monitoring Item 25: Threatened and Endangered Wildlife

Objective 220. Conserve or enhance habitat for federally listed threatened, endangered and proposed species.

Monitoring:

Threatened and Endangered Species



The bald eagle is the only threatened (T) or endangered (E) species with documented occurrence or suitable habitat in the Black Hills; therefore, it is the only T or E species the Forest monitors.

Bald eagles winter in and migrate through the Black Hills. From October through March, eagles can frequently be seen feeding on road-killed animals, perched near unfrozen lakes or streams, or soaring in the sky. There are no known traditional (repeated use) roost sites in the Black Hills. However, the ponderosa-pine landscape does provide abundant suitable roost structures used on a transitory basis. Transitory roost sites do

not appear to be a limiting factor on the Forest.

No nesting attempts had been recorded in the Black Hills until 2004, when a pair of bald eagles tended a nest in the southern Black Hills (Staab 2004). The eagles left the area later that spring without successfully nesting. Neither the contents of the nest nor the reasons for the failed attempt are known. The nest site was approximately ¼ mile outside the Forest boundary on a reservoir in Custer State Park. Due to the close proximity to the Forest and the unprecedented reproductive behavior, eagles observed on the Forest during spring will be evaluated for potential nesting activity.

The Forest monitors wintering bald eagles by recording sightings during normal work activities (i.e., incidental observations). In some cases, biologists drive along specific road segments and record eagle sightings. This non-standardized methodology may result in highly variable numbers that may not reflect actual population trends.

The table below shows the number of bald eagles observed on each district over the past five years. The number of observations has been variable with an annual average of 66 birds. The 2004 observation is approximately 25 percent higher than that average.

District	Number of Annual Bald Eagle Sightings				
	FY2000	FY2001	FY2002	FY2003	FY2004
Bearlodge	0	0	15	15	13
Hell Canyon	14	5	9	5	10
Mystic	24	22	51	>55	30
Northern Hills	9	0	0	23	29
Total Forest	47	27	75	>98	82

Source: Black Hills National Forest Data

Monitoring Item 26: Habitat Capability Relationships, including Management Indicator Species (MIS) for Wildlife

Objectives:

- 217. Maintain habitat for game and fish populations at the state objectives in effect in 1996.**
- 218. Conserve or enhance habitat for resident and migratory non-game wildlife. Increase habitat capability for species when recommended in project level analysis.**
- 219. Maintain or improve instream fisheries habitat. Cooperate with state agencies in aquatic ecosystem improvements to meet mutually agreed-upon objectives.**
- 221. Conserve or enhance habitat for sensitive species and species of special interest (management indicator species) listed in Chapter Two.**

Management Indicator Species (MIS) identified in the 1997 Forest Plan (as amended) were reported in the 2003 Monitoring and Evaluation Report. They are not scheduled for reporting this year. Several alternatives in the Phase II Amendment DEIS (USDA Forest Service 2004) propose to add four wildlife species to the Forest's MIS list. If one of these alternatives is selected for implementation, the species will become MIS. Therefore baseline monitoring information for these four species is provided in this section. Because some of these species have not been previously monitored, population and habitat trends are not yet available. The four proposed MIS species are: beaver, common yellowthroat, golden-crowned kinglet, and ruffed grouse.

POTENTIAL MIS SPECIES

NON-GAME MAMMALS

Monitoring:

Beaver



Beaver are found in suitable habitat throughout much of North America. They use riparian habitats dominated by stands of willow, aspen or cottonwood (Streubel 1989). Beaver are absent from areas lacking permanent water and an adequate supply of suitable woody vegetation. The beaver's strong association with hardwood riparian areas is the basis for its proposed MIS selection.

Historically beaver were heavily trapped in the Black Hills. By the late 1880s, populations were low and restricted to remote areas (Parrish et al. 1996). Beaver have increased since then and are now widely distributed in both South Dakota (Higgins et al. 2000) and Wyoming (Cеровski et al. 2004). Beaver can be legally harvested in both states, but hunting regulations moderate the effect on populations.

Baseline beaver surveys were conducted on the Forest during September 2004. Beaver and their habitats were most common in the Bearlodge Mountains and in the central Black Hills, though they were present in other areas as well. A total of 74 active and 5 inactive beaver colonies were observed on National Forest System lands during aerial and ground-based surveys. Assuming an average of 3.5 to 5.3 beaver per colony (Payne 1981), the current estimated population size is between 250 and 390 beaver.

The reduction in beaver activity that occurred from heavy trapping likely caused a lowering of water tables and a subsequent loss of willows and other riparian vegetation (USDA Forest Service 2004 p. 3-38). This, in conjunction with other factors, has resulted in a reduction in natural riparian habitat in the Black Hills since pre-European settlement occurred. Currently approximately 64,000 acres of riparian habitat occur on the Forest (USDA Forest Service 2004, p 3-38). This includes riparian areas with an overstory of hardwoods or conifers. Of this area, about 12,000 acres (19%) have a willow component.

The ArchSI model was used to estimate year-long habitat suitability for beaver by analyzing vegetation types and structural stages (Juntti and Rumble 2004). The ArchSI value for year-round beaver habitat was 0.0171 in 2004.

Beaver	Year 2004
Number of Colonies	74
Estimated Population Size	250-390
Habitat Suitability Index	0.0171

Source: Black Hills National Forest data

Evaluation:

The long-term beaver population trend has increased in the Black Hills since heavy trapping has been moderated by hunting regulations. Surveys conducted in 2004 will serve as a baseline comparison for determining future trends. Although riparian habitats have decreased since the pre-European settlement era, the short-term habitat trend is unknown. According to USDA Forest Service (2004), changes in habitats and populations will likely be slow, and may take decades to distinguish.

NON-GAME BIRDS

In 2001 the Forest began funding the Rocky Mountain Bird Observatory (RMBO) to monitor long-term trends of bird populations through point-count transect surveys. The monitoring program is titled *Monitoring Birds of the Black Hills* (MBBH). Results are reported to the Forest annually (Panjabi 2001, 2003, 2004,

2005). Ten habitats throughout the Forest are being monitored: white spruce, northern hills ponderosa pine, southern hills ponderosa pine, late-successional ponderosa pine, aspen, pine-juniper shrubland, mixed-grass prairie, montane riparian, foothill riparian, and burn area (mainly the Jasper fire of 2000). Not all habitats will be monitored in all years, and adjustments in habitat classifications and transect locations have been and may continue to be necessary as we refine the monitoring program. The monitoring is designed to provide rigorous population trend data on most regularly occurring diurnal (day active) breeding species in the Black Hills using a statistically sound sampling design. Trends in abundance may be less clear for rare species or those with highly variable occurrences; however, the monitoring program will provide insight into other population characteristics such as distribution and habitat associations.

In 2004, RMBO sampled 2,036 point-count stations along 140 transects in 5 habitats. The habitats were as follow: burn area, aspen, late-successional ponderosa pine, mixed-grass prairie, and pine-juniper shrubland. A total of 111 breeding bird species were detected, including the three proposed MIS species discussed below. This is the fourth year of a long-term monitoring effort; continued monitoring is needed to detect long-term trends. However the Forest is obtaining valuable preliminary data on species densities and habitat associations crucial to long-term trend detection and evaluation of management effects.

Monitoring:

Common Yellowthroat



The common yellowthroat occurs locally during summer throughout much of the Black Hills (Panjabi 2002). The species primarily uses riparian and other wetland habitats (Panjabi 2001, 2003). The yellowthroat's strong association with riparian areas is the basis for its proposed MIS status, and as such, riparian areas are the only habitat types reported here.

The Forest monitors the common yellowthroat through the MBBH program. Changes have occurred in the MBBH riparian classification scheme since the program began in 2001, but it is likely that the current sampling of two riparian habitats – montane and foothills – will continue into the future. However, due to limited monitoring funds, neither of these habitats was sampled in 2004, and only montane habitats were sampled in 2003. Results from the MBBH program are presented in the table below.

Habitat	Relative Density Estimate of Common Yellowthroat by Year (birds/km ²)		
	2002	2003	2004
Montane Riparian	50.35	32.97	Not Monitored
Foothills Riparian	27.43	Not Monitored	Not Monitored

Source: Panjabi (2001, 2003, 2004, 2005)

The composition, structure, and pattern of riparian areas (i.e., yellowthroat habitat) in the Black Hills have changed over the last 120 years due to a number of influences (USDA Forest Service 2004 p. 3-38). As a result, riparian habitats are much less abundant today. More recent changes are not well documented; therefore the short-term habitat trend is unknown.

There is no ArcHSI model to estimate baseline Forestwide habitat suitability for the common yellowthroat.

Evaluation:

Between 2002 and 2003, relative densities of common yellowthroats decreased from 50 to 33 birds/km². It is unknown if this represents a true population decline, but additional monitoring is expected to clarify this. The long-term habitat trend from the past for the common yellowthroat shows a decrease, but short-term trends in recent years are unknown. The monitoring program for yellowthroats is in its infancy and information presented here is considered baseline data.

Monitoring:

Golden-crowned Kinglet



The golden-crowned kinglet is an uncommon permanent resident at higher elevations in the Black Hills (Tallman et al. 2002). It occurs primarily in the white spruce habitat type (Panjabi 2003). The bird's strong association with spruce is the basis for its proposed MIS status, and as such, it is the only habitat type reported here.

The Forest monitors the golden-crowned kinglet through the MBBH program. The white spruce habitat was sampled in 2001 through 2003, but not in 2004. Results are presented in the table below, and show a variable trend. Breeding Bird Survey data indicate that golden-crowned kinglets may be increasing in the Black Hills; however, data are based on few routes and lack statistical significance (Sauer et al. 2003 in USDA Forest Service 2004, p. 3-190). Breeding Bird Survey data on a regional scale show that population trends are increasing in eastern and central North America, but decreasing in the West.

Habitat	Relative Density Estimate of Golden-crowned Kinglets by Year (birds/km ²)			
	2001	2002	2003	2004
White Spruce	24.6	18.5	58.6	Not Monitored

Source: Panjabi (2001, 2003, 2004, 2005)

Spruce habitat (i.e., kinglet habitat) is naturally patchy and of low abundance in the Black Hills (USDA Forest Service 2004 p. 3-190). Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills. Spruce was estimated to have comprised about 15,000 acres of the pre-1900 forested landbase. In 1995 the spruce acreage was estimated at 21,737 acres. The white spruce cover type now occurs on 25,000 acres on the Forest demonstrating a steady increase.

The ArcHSI model was used to estimate baseline habitat suitability for the golden-crowned kinglet by analyzing vegetation types and structural stages (Juntti and Rumble 2004). The ArcHSI values are presented in the table below.

2004 Season	ArcHSI Values for the Golden-crowned Kinglet
Summer	0.0152
Winter	0.4618

Evaluation:

Golden-crowned kinglets showed a moderate decrease in density between 2001 and 2002, and a large increase in 2003. These data suggest an overall increasing short-term population trend. It is unknown whether the three-fold increase between 2002 and 2003 represents a true increase in population trend, but additional monitoring is expected to clarify this. Habitat trend for the golden-crowned kinglet appears to be increasing based on the short- and long-term increases in spruce forests.

GAME BIRDS

Monitoring:

Ruffed Grouse



The ruffed grouse is a year-round resident in the Black Hills. It occurs widely but in low abundance (Panjabi 2003). The species is dependent on the availability of aspen buds for winter survival. The strong association between ruffed grouse and aspen is the basis for the bird's proposed MIS status.

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The South Dakota Department of Game, Fish and Parks collected ruffed grouse data along transects in 2003 and 2004. The transects crossed a variety of habitat types in the northern and central Black Hills. Results from 2003 are presented in the table below. Data collected in 2004 have not yet been compiled.

Ruffed Grouse	Estimated Density in 2003 (birds/lineal mile)
All Routes Combined	0.16
Routes Where Grouse Were Detected	0.28

Source: Wrede (2004)

Ruffed grouse are also tracked through the MBBH program. However, because the peak period for detecting grouse occurs before the MBBH sampling season starts, it is a less accurate method for estimating densities. Therefore, no MBBH data are presented for ruffed grouse.

Aspen stands have been replaced in many areas by pine and spruce, and may have declined as much as 20 percent since the 1970s (Rumble 2002 *in* USDA Forest Service 2004, p. 3-23). The species currently occupies approximately 49,000 acres on the Forest.

The ArcHSI model was used to estimate year-long habitat suitability for ruffed grouse by analyzing vegetation types and structural stages (Juntti and Rumble 2004). The ArcHSI value was 0.2964 in 2004.

Evaluation:

The monitoring program for ruffed grouse is in its infancy, and information presented here are considered baseline data.

AQUATIC MIS

The Phase I Amendment designated brook trout, brown trout, finescale dace, lake chub, and mountain sucker as Management Indicator Species (MIS). Brook trout and brown trout are important game species not native to the Black Hills. Lake chub, finescale dace, and mountain sucker are native to the Black Hills area.

Fisheries data collected by the South Dakota Department of Game, Fish and Parks (SDGFP) and the Wyoming Game and Fish Department (WGFD) give an indication of population trend in the Black Hills.

Monitoring:

Brook Trout, Brown Trout and Mountain Sucker

Population Trend.

Brook trout and brown trout were stocked or transplanted on the Black Hills prior to the 1900s. These species are well-distributed forestwide, and most suitable habitat is currently occupied by one or both species. Brook and brown trout populations are managed to provide recreational fisheries sustained largely by natural recruitment. Harvest regulations and the supplemental stocking of streams, primarily with brown trout, in combination with habitat management maintain populations at desirable levels.

Historic surveys indicate the mountain sucker was widely distributed across the Black Hills (Evermann and Cox 1896, Bailey and Allum 1962, Stewart and Thilenius 1964). Recent surveys suggest mountain sucker occur in many of its historic drainages throughout the Black Hills (Isaak et al. 2003), but localized population reductions or absence at selected sites may have occurred.

Population estimates at forestwide survey sites for brook trout, brown trout, and mountain sucker are shown in **Tables A and B**. Not all species are expected to be collected at every site. Target species for that site are highlighted in yellow. Population estimates in **Table A** are reported as the number of fish per mile. Population estimates in **Table B** are the number of fish estimated in a sampled stream section, usually 100

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meters.

Table A. Historic populations (number of fish/mile) of brook trout, brown trout and mountain sucker (Stewart and Thilenius 1964).

Stream	Reach/Site	Date	Number of fish/mile by species		
			BKT	BNT	MTS
Battle Creek	Grizzly Gulch confluence to 0.5 mile above Hayward	6/60	0	10	140
Bear Butte Creek	0.5 mile below Chicken Inn to Strawberry Creek confluence	7/60	70	0	20
Boxelder Creek	Steamboat Rock Picnic Ground to Norris Peak Road	7/62	10	10	-
Elk Creek	Hall Ranch to Highway 385	7/61	0	0	300
French Creek	Stockade Lake to Hwy 87	7/60	20	0	130
Iron Creek	Headwaters to 0.5 mile below Camp Remington	8/62	80	0	140
	Camp Remington to 0.25 mile below Highway 16A	7/60	230	0	10
Little Spearfish Creek	Headwaters to Forest Service Work Center	7/60	1,100	320	0
Rapid Creek	Castle Creek confluence to 1 mile below Silver City	8/62	0	540	0
Rhoades Fork	Beaver Ponds to South Fork Rapid Creek confluence	7/62	1,480	1,330	0
South Fork Rapid Creek	Melcher Sawmill to North Fork Rapid Creek confluence	7/59	0	260	220
Spring Creek	1 mile east of Hill City to Mitchell Lake	9/59	0	0	3,890

BKT = brook trout; BNT = brown trout; MTS = mountain sucker

Table B. Population estimates for brook trout, brown trout and mountain sucker at designated survey sites (1980s – present).

Sampling Site	Date	Species				
		BKT		BNT		MTS
		< 8"	≥ 8"	< 8"	≥ 8"	
Battle Creek Site 4	7/84	41	4	0	0	0
	6/94	104	15	0	0	0
Bear Butte Creek Site 14	9/84	0	0	0	0	7
	9/97	0	1	0	0	87
	11/97	5	2	0	0	257
	9/98	0	0	0	0	0
	9/99	64	11	0	0	3
	9/00	100	27	0	0	168
	10/01	155	7	0	0	78
	9/02	221	8	0	0	17
	9/03	108	3	0	0	4
9/04	353	6	0	0	21	
Bear Butte Creek Site 15 (Site 6.5 data pre-1990) (Site 3 data pre-2000)	9/84	0	0	0	0	14
	9/92	14	0	0	0	134
	7/97	18	1	0	0	80
	11/97	9	6	0	0	12
	9/99	104	3	0	0	0

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Sampling Site	Date	Species				
		BKT		BNT		MTS
		< 8"	≥ 8"	< 8"	≥ 8"	
	9/00	91	50	0	0	123
Boxelder Creek site 1 (1984 Site 9)	7/84	58	7	199	76	22
	7/93	41	2	22	8	19
Boxelder Creek site 2	7/93	25	4	21	27	5
Corral Creek Site 1 (1985 Site 3)	6/85	35	3	0	0	0
	7/94	100	56	0	0	0
East Spearfish Creek Site 1	9/88	1	0	187	86	0
	10/92	0	1	222	95	0
	6/98	5	0	384	87	0
East Spearfish Creek Site 2	7/85	1	0	98	20	0
	9/88	5	0	86	95	0
	9/90	0	0	96	39	0
	10/92	8	2	200	31	0
	6/98	0	0	115	30	0
East Spearfish Creek Site 3	9/88	0	0	99	80	0
	10/92	1	0	228	33	0
	6/98	4	0	210	34	0
Elk Creek Site 4	6/85	37	8	0	0	253
	7/97	105	40	8	0	213
Elk Creek Site 5	9/84	13	16	1	18	89
	8/97	96	16	2	2	250
French Creek Site 5	5/92	0	0	1	37	31
	9/93	0	0	7	2	1
Iron Creek South Site 2	7/84	104	0	0	0	0
	7/92	205	0	1	0	0
	7/93	139	0	1	0	0
	7/94	412	0	0	0	0
	8/98	318	3	0	5	0
Iron Creek South Site 4	7/93	100	0	0	0	0
Little Spearfish Creek Site 1	7/85	1	0	9	2	0
	8/94	29	1	26	26	0
Little Spearfish Creek Site 2	6/98	91	2	28	6	0
Rapid Creek Site 1	9/92	0	0	81	26	0
	9/93	0	0	84	14	0
	9/94	0	0	254	25	0
	10/95	0	0	32	18	0
	9/96	0	1	20	8	0
	9/99	0	0	42	23	0
Rapid Creek Site 3	8/90	0	0	65	11	0
	9/91	0	0	92	21	0
	9/92	0	0	74	36	0
	9/93	0	0	179	42	0
	9/99	0	0	114	31	0
	10/00	0	0	51	23	0
	10/01	0	0	29	14	0
	10/02	0	0	48	13	0
Rapid Creek Site 4	9/85	0	0	67	70	0
	8/90	0	0	180	37	0
	10/91	0	0	159	0	0

Sampling Site	Date	Species				
		BKT		BNT		MTS
		< 8"	≥ 8"	< 8"	≥ 8"	
	9/92	0	0	194	78	0
	9/93	0	0	232	37	0
	9/94	0	1	145	69	0
	10/95	0	0	107	38	0
	9/96	0	0	75	28	0
Rhoads Fork of Rapid Creek	9/85	20	0	234	18	0
	7/94	1	0	133	16	0
	5/03	0	0	130	18	0
	9/03	0	0	35	7	0
South Fork Rapid Creek Site 1	8/84	0	0	32	3	0
	7/94	0	0	122	6	0
	5/03	0	0	31	17	0
	9/03	0	0	62	21	0
South Fork Rapid Creek Site 2	8/84	0	0	82	3	0
	7/94	0	0	149	15	0
Spring Creek Site 3	7/84	0	0	1	6	21
	7/93	22	3	1	0	28
Spring Creek Site 7	7/84	0	0	1	1	0
	9/93	1	0	0	0	25

BKT = brook trout, BNT = brown trout, MTS = mountain sucker

Source: SDGFP Fisheries Database of Black Hills stream surveys.

Habitat Trend

Habitat condition is influenced by natural events, such as droughts or floods, and human activities. Drought conditions that persisted in 2004 affected both the quality and quantity of aquatic habitat. Stream flows were reduced. Some streams flow more intermittently and/or for shorter distances. Reservoir levels are not replenished so that downstream releases may be reduced subsequently affecting downstream fisheries such as on Spring Creek below Sheridan Dam.

In the long-term reduced stream flows have been attributed to increased timber density and canopy closure (Stewart and Thilenius 1964). Other private, state and Federal management/development activities have historically and continue to affect aquatic habitats. The effects of these activities on the BBNF have been reduced compared to past conditions due to increased environmental laws, regulation and policy.

On a more localized level, projects have been implemented to improve the quality or quantity of stream habitat in cooperation with state resource agencies and local partners. These efforts have included projects such as stream enhancement on Castle Creek and Rapid Creek downstream of Deerfield and Pactola reservoirs, respectively, to repair flood damage caused in the 1970s. Other projects to improve streamside vegetation and bank stability as well as instream diversity have occurred on Iron Creek, Box Elder Creek, and other perennial streams.

Modified streamflows and habitat enhancements downstream of major reservoirs provide the conditions for high quality recreational trout fisheries. Generally more stable flows exist compared to natural conditions. These tailwater conditions exist at Deerfield Dam and Pactola Dam. Releases from Sheridan Dam are contingent upon inflow and maintaining the reservoir level; therefore, maintenance of brown trout fisheries has been sporadic especially in dry years. These reservoir-influenced conditions combined with the management emphasis on trout and the habitat fragmentation caused by the dam itself may be to the detriment of some native fish species such as mountain sucker.

Evaluation:

At the selected survey sites, populations of brook trout, brown trout and mountain sucker have fluctuated over time due to environmental conditions and other factors. Brook trout and brown trout have persisted at all targeted sites. Mountain sucker occurrence at several sites has differed over time. On upper Iron Creek this species was documented in the early 1960s, but was not present in more recent surveys. On Boxelder Creek, mountain sucker were not documented in the early 1960s but were documented in surveys in the early 1990s. And lastly mountain sucker were documented in 1993 at Spring Creek Site 7, but were not documented there in 1984. Management for non-native recreational fisheries has been identified as a potential threat to mountain sucker (Isaak et al 2003). Site- and species-specific circumstances need to be considered. Based on the data, brook trout and mountain sucker coexist on Bear Butte Creek in the absence of brown trout, a more piscivorous (fish-eating) species. In streams where a sustainable population of larger brown trout exist, mountain sucker may not fare as well. Where conditions favor mountain sucker, occupancy of this habitat may be limited by instream barriers that restrict mountain sucker movements.

Monitoring:**Lake Chub****Population Trend**

The overall population trend of lake chub on the Forest is one of decline when comparing past to present distribution and numbers. Historic accounts suggest the lake chub was widely distributed across the Black Hills (Isaak et al. 2003). Surveys conducted in the early 1890s documented lake chub in Rapid, Spring, French and Beaver creeks (Evermann and Cox 1896) though the proper identification of at least some of these specimens is questionable (unpublished data). Subsequent surveys summarized by Bailey and Allum (1962), confirmed the presence of lake chub in previous locations into the late 1920s and early 1930s and identified additional occurrences in Grace Coolidge Creek and South Fork Castle Creek. Observations of lake chub in Wyoming have included the Belle Fourche River, Inyan Kara Creek and Blacktail Reservoir off of the Forest (Isaak et al. 2003). The lake chub population on the Forest is currently restricted to Deerfield Reservoir, which impounds upper Castle Creek.

Trend data collected by SDGFP since 1994 suggest the population in Deerfield Reservoir is in a downward trend, but is certainly greater than when the reservoir was chemically renovated in 1982 to reduce the white sucker population (Isaak et al. 2003). The number of lake chub collected and catch per unit effort (CPUE) based on SDGFP gill net sampling since 1994 is shown in the following table.

Gillnet sampling	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
# caught	N/A	N/A	N/A	15	155	55	11	6	4	3	1
CPUE*	114.3	105.5	109.0	3.8	38.8	13.8	2.8	1.5	0.6	0.8	0.3

* Catch Per Unit Effort equals the number of fish caught per gillnet set overnight.

Source: SDGFP 2001 and SDGFP unpublished data

Habitat Trend

Human activities post-European settlement have altered riparian/aquatic ecosystems. The construction of dams and diversion structures has fragmented stream habitats and prevented the types of stream movements many stream fishes make in association with spawning, overwintering, or refounding populations (Isaak et al. 2003). In the case of lake chub, these human-created impoundments are not entirely negative as evidenced by this species persistence only in Deerfield Reservoir.

Habitat condition in Deerfield Reservoir is stable based on trophic state (total weight of plant biomass in a waterbody at a specific location and time). In simple terms, eutrophication is the movement of the lake's trophic state in the direction of more plant biomass. Waterbodies with low trophic state index (TSI) values (30-40) are considered oligotrophic (clear, well oxygenated, nutrient poor) while those with higher values (>50) are considered eutrophic (Carlson and Simpson 1996). Piroutek (1991) reported the trophic status of

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Deerfield Reservoir was comparable to conditions in 1980, suggesting habitat conditions for lake chub had not deteriorated. The TSI values (Carlsen 1977) calculated based on secchi disk (SD) transparency, chlorophyll a (Chl a), and total phosphorus (TP) are shown below for a comparison of past to present conditions.

TSI Values	6/79	8/79	6/80	8/95	8/96	8/97	9/99	9/00	2001	2002	2003	2004
SD	36	38	40	36	41	41	39	39	-	-	32	39
Chl a	-	-	36	36	39	53	47	-	-	-	-	-
TP	37	37	-	37	37	47	46	37	44	-	37	41

Source: SDGFP 2001 and SDGFP unpublished data

TSI values in 2000 indicated a return to oligotrophic conditions after drifting into the mesotrophic range based on increased levels of chlorophyll a and total phosphorus that occurred in 1997 and 1999 (SDGFP 2001). These oligotrophic conditions were maintained based on 2004 data.

The deposition of sediments and the natural process of eutrophication will gradually decrease the amount of habitat available for lake chub. Sabtan (1988 cited in Piroutek 1991) estimated a 0.3 percent annual loss in reservoir volume due to sedimentation. The low rate of sedimentation was attributed to the small, vegetated drainage area with underlying rock formations resistant to erosion and the absence of large-scale agricultural activities or extensive development in the drainage.

Evaluation:

Reservoir conditions appear stable and suitable for lake chub in relation to TSI values based on water clarity and total phosphorus. The downward population trend is likely due to other reservoir conditions and/or interactions with other native and non-native species, but these relationships have not been studied or proven.

Monitoring:

Finescale Dace

Population Trend

In the South Dakota portion of the finescale dace's range, no populations historically or currently have been documented to exist on BHNF lands (Isaak et al. 2003). In the Wyoming Black Hills, finescale dace distribution is limited to the Redwater Drainage with the exception of Geis Irrigation Reservoir on Middle Fork Hay Creek. The distribution and numbers of finescale dace in Wyoming has been influenced by transplants (WGFD 1996). It is unclear if these transplants, when successful, were an effort to establish the species in unoccupied suitable habitat, to supplement existing populations, or to reestablish extirpated populations.

In June 1978, finescale dace were collected from Medicine Lake and from a beaver pond on the North Fork of Cow Creek and were transplanted to the following creeks in the Bear Lodge area (B. McDowell, WGFD 2004, pers. comm.):

- Tent Canyon Creek (n = 74)
- Richardson Creek (n = 24)
- Cole Canyon Creek (n = 124)
- North Fork Miller Creek (n = 303)
- Ogden Creek (n = 49)
- Lytle Creek (n = 124)

Follow-up sampling in 1979 recaptured finescale dace in Tent Canyon, Richardson, Cole Canyon, and both forks of Lytle Creek.

Finescale dace were first documented in Hemler Reservoir during a chemical treatment in 1976. A large population was found in the reservoir during sampling in 1979 (B. McDowell, WGFD 2004, pers. comm.). Finescale dace were transplanted from Ogden Creek into Hemler Reservoir in 1982 and have been recorded in sampling since that time. Finescale dace were transplanted from Ogden Creek to Sand Creek in 1982, but this transplant was unsuccessful. Geis Irrigation Reservoir, located on Middle Fork Hay Creek and immediately downstream of the BHNF boundary, was stocked in 1983 with finescale dace from Hemler Reservoir.

Surveys in 1990 found finescale dace in very marginal habitat of decadent beaver ponds on Ogden Creek. Based on 1997 observations, populations of finescale dace persist in Richardson, Tent Canyon, Ogden, Rocky Ford, Cow, Redwater, and Spotted Tail creeks and Hemler Reservoir (WYNDD 2002). The relative abundance of finescale dace at these sites is generally rare with the exception of Hemler Reservoir, where this species was classified as common (WGFD 1996). Olson (1998) collected finescale dace with little effort in Hemler Reservoir and estimated the population as sizeable but did not collect this species upstream or downstream of the reservoir.

The WGFD sampled several stream sites on Cow Creek and Redwater Creek in 2003 but only found finescale dace in Hemler Reservoir where the population is thriving (B. McDowell, WGFD 2004, pers. comm.) Finescale dace were observed in Hemler Reservoir in October 2004 and appeared to be abundant (S. Hirtzel personal observation) but no specific sampling was done to quantify abundance.

Habitat Trend

Isaak et al. (2003) speculated a general negative trend in stream habitat has occurred due to land use practices that probably lowered water tables along streams. This in combination with a reduced beaver population compared to historic abundance has decreased the amount of boggy, pond-like habitat preferred by this species.

Dams, such as at Hemler or Geis reservoirs, fragment stream habitat but also provide standing water habitats favorable to finescale dace. The amount of habitat in these reservoirs is dependant on environmental conditions, such as drought as well as human activities. Hemler Reservoir and the associated water rights are held under private ownership. The reservoir is affected by dewatering for irrigation and stockwater use that reduces habitat availability but conditions appear adequate to sustain a finescale dace population.

Evaluation:

Finescale dace populations are restricted to the Bearlodge District. Current distribution is sporadic and has been influenced by past transplantation efforts. Abundance is affected by natural events such as drought and human-caused activities such as water withdrawals in Hemler Reservoir. Species' distribution and abundance will likely be improved by management efforts that enhance or create standing water habitat, such as beaver ponds within the stream network.

Monitoring Item 27: SCENERY – Scenic Integrity

Monitoring – Prescribed Burn:

The Gordon Prescribed Burn near the junction of U.S. Highways 16 and 385 on the Mystic Ranger District was completed in November 2002.

On April 15th, 2004, approximately 18 months after the prescribed burning was completed, the project was reviewed by an interdisciplinary team including: the district assistant fire management officer (burn boss), district fire station manager (ignition specialist), district recreation staff officer, Mystic district ranger, Forest landscape architect, Forest resource staff officer (for timber, wildlife, water, soil, fire, range, fisheries, planning), Forest silviculturalist, Forest wildlife biologist, regional fire planner, and others.

In November 2004, approximately 24 months after the prescribed burns, the project was revisited by the Forest landscape architect to document any additional changes.

Background

The Gordon Prescribed Burn was a project to meet wildlife goals and objectives as follows:

- increase grass/forbs production by consuming 40 to 70 percent of the litter layer,
- reduce fuel loading by 50 percent over 60 percent of the burn area,
- kill 50 percent of the overstory in ¼ to 5 acre patches over 2 to 10 percent of the burn area.

The scenic integrity objective (SIO) for this middle ground view is MODERATE. This burn unit is located approximately ½ mile from U.S. Highway 385.

A MODERATE scenic integrity refers to landscapes where the valued landscape character “appears slightly altered.” Noticeable deviations must remain visually subordinate to the landscape character being viewed. Landscape Aesthetics, chapter 2, pg. 4.

A LOW scenic integrity refers to landscapes where the valued landscape character “appears moderately altered.” Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, effect, and pattern of natural opening, vegetative type changes or architectural styles within or outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within. Landscape Aesthetics, chapter 2, pg. 4

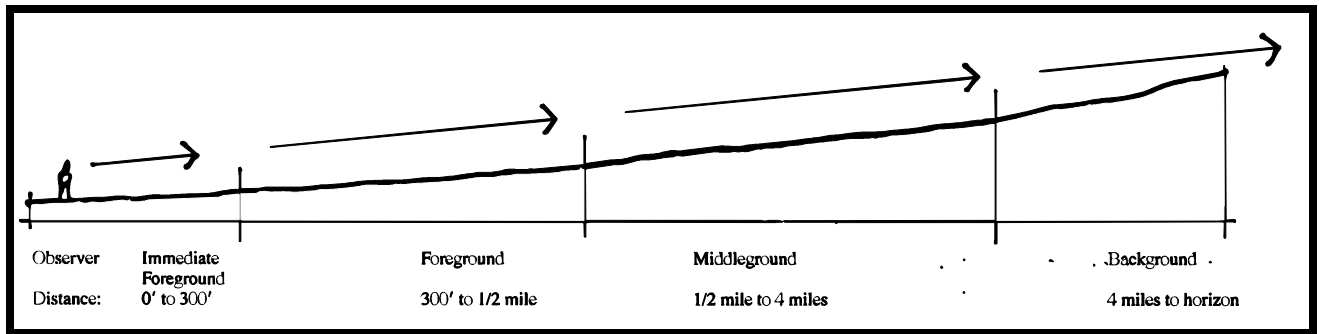
The following Black Hills National Forest Land and Resource Management Plan (LRMP) standards and guidelines specifically apply to this project:

4104. Visual effects of prescribed fire will comply with the approved SIO of the area. STANDARD, LRMP page II-53

5605. Plan, design and locate vegetation manipulation in a scale that retains the color and texture of the landscape character, borrowing directional emphasis of form and line from natural features. GUIDELINE, LRMP page II-72

5606. Where the SIO criterion is High or Moderate, meet the criterion within one full growing season after completion of a project. Where it is Low or Very Low, meet the criterion within three full growing seasons after completion of a project. GUIDELINE, LRMP page II-72

5611. Vary stand densities to create vegetative diversity in areas with an adopted scenic integrity objective of Moderate or High. GUIDELINE, LRMP page II-72



Landscape Aesthetics, Chapter 4, pg. 5

Evaluation:

The landscape in this area is generally covered by a 'blanket' of trees with few visible, if any, openings or variations in stand densities. This prescribed fire project helped create some variety in this landscape through vegetative diversity. The treatment areas affected through this project, are in scale with the surrounding open areas (meadows) that are evident in the immediate foreground of U.S. Highway 385.

Approximately 18 months after the prescribed burn the management was highly evident from U.S. Highway 385 as the fire-killed trees with red needles visually created a strong contrast with the surrounding green of the living trees that called attention to itself. Although most people would not have been able to tell the difference between a prescribed fire and a wildfire, they could readily tell that something had happened on this hillside to kill the majority of the trees. In addition the limited opportunities to view the hillside as well as the location approximately ½ mile from the highway (and at a 70 to 90 degree angle from the highway) makes the treated area less obvious than if located in line with the highway.



18 months after the burn, the view adjacent to the prescribed burn unit.

Approximately 24 months after the prescribed burn, the majority of the red needles on the fire-killed trees had dropped. The strong color contrast between red and green is no longer evident over the treated area as only a few isolated trees (with red needles) remain.



24 months after the burn, the view from U.S. Highway 385 near the junction of U.S. Highway 16.

At 18 months, this project was judged to meet the SIO of LOW.

At 24 months, this project was judged to meet the SIO of MODERATE.

This project did not meet the timeframe as outlined in LRMP Guideline 5606: “Where the SIO criterion is High or Moderate, meet the criterion within one full growing season after completion of a project.”

Black Hills NF LRMP Direction	LRMP Objective	Achieved	Achieved
Time Frame	12 months	18 months	24 months
Scenic Integrity	Moderate	Low	Moderate

Although this one project does not provide enough information to form a baseline to determine the exact time it takes for needles to fall from a fire-killed tree, it does provide an indication that it does takes more than 12 months for the needle fall process to occur. In the future where high tree mortality is desired to meet management objectives expect that the fire-killed trees will be highly visible in the landscape for up to two years. Depending upon the SIO assigned in the LRMP to the project area, the project may not meet the timeframe identified in LRMP Guideline 5606, and this should be disclosed during the project planning phase.

Monitoring Item 28: Heritage Resources

Objectives:

- 403. Improve the management of heritage resources and integrate them with recreation and education while providing for compliance with all applicable laws and regulations.**
 - a. Increase numbers and types of heritage resource interpretive sites and opportunities. Provide five projects per year during the plan period.**
 - b. Conduct six heritage resource stabilization and rehabilitation projects per year during the plan period.**
 - c. Nominate eligible sites (approximately five per year in the plan period) to the National Register of Historic places.**
 - d. Inventory 50,000 acres each year in the plan period for heritage resource sites.**
- 404. Conduct three research projects each year to support heritage resource management.**
- 405. Manage all heritage sites listed in the National Register of Historic Places in consultation with the State Historical Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation (ACHP).**
- 406. Provide opportunities for the public to participate in heritage management activities, including the monitoring, excavation, and protection of archeological sites.**

Monitoring:

Introduction

Heritage monitoring efforts are used to measure the level of success in meeting management goals and objectives for heritage resources. The level of success can be measured each year and more importantly over a five-year period. For this report the results of monitoring over a five-year period will be reviewed as a measure of movement toward heritage resource management goals and objectives.

Direction for management of heritage resources is provided in Goal 4 of the Forest Plan: "Heritage resources will be protected and interpreted so that visitors can better understand their environment and how heritage resources fit into the context of multiple use management" (Forest Plan, pp-I-23). Heritage objectives are listed above.

FY2004 Monitoring Accomplishments

Monitoring items for heritage resources measure two areas of emphasis for the program. Monitoring Items 1 through 4 reflect our responsibility to comply with Federal law and regulation for the protection of heritage resources under Section 106 of the National Historic Preservation Act (NHPA) (See **Table 1.**) The relatively large numbers exhibited in Monitoring Items 1 through 4 are in themselves a reflection of the large number of undertakings conducted on the Black Hills National Forest each year and funded through the primary purpose philosophy by other resource programs such as timber and range. Completion of heritage compliance protocols is required before project implementation. In FY2004 an increased emphasis was placed on monitoring site avoidance plans (Item #2), and protection of previously recorded sites (Item #4). Increased accomplishments for both items were a result of using indefinite delivery/indefinite quantity contracts to conduct monitoring during field inventories (Item #4), and to some degree by freeing up Forest personnel from survey to conduct avoidance plan monitoring (Item #2). Monitoring Items 5 through 7 reflect the agency's responsibility to preserve and interpret heritage resources for public benefit under Section 110 of the NHPA. These activities are funded directly by heritage program funds as the primary purpose function. The relatively low numbers exhibited in Monitoring Items 5 through 7 indicate a lack of adequate funding to meet proposed accomplishments in the Section 110 portion of the heritage resource program.

Table 1. Heritage Monitoring Accomplishments.

Monitoring Items	FY2000	FY2001	FY2002	FY2003	FY2004
1. Heritage resources compliance process completed prior to signing of environmental decision document (comply with NEPA, NHPA, and Chiefs Direction).	107 Projects	51 projects	124 projects	177 Projects	173 Projects
2. Avoidance or mitigation requirements effectively implemented prior to, during, and after project (comply with NHPA/NEPA).	41 mitigation or avoidance projects monitored	189 mitigation or avoidance projects monitored	51 mitigation or avoidance projects monitored	17 avoidance projects monitored	66 mitigation or avoidance projects monitored
3. Inventories conducted to comply with the Archaeological Resource Protection Act, as amended 1988.	127 projects covering 28,686 acres completed	137 projects covering 41,713 acres completed	92 projects covering 78,891 acres completed	81 projects covering 61,375 acres completed	71 projects covering 59,758 acres completed
4. Protection of heritage resources listed in, or eligible for listing on the National Register of Historic Places. May or may not be associated with project specific activities (comply with NHPA).	143 sites monitored	248 sites monitored	36 sites monitored	29 sites monitored	64 sites monitored
5. Number of heritage resource interpretive sites provided (including sites, signs, roadside pullouts, brochures, public participation opportunities, sponsorship of heritage activities, etc.).	27 interpretive programs provided	34 interpretive programs provided	21 interpretive programs provided	29 interpretive programs provided	23 Interpretive programs or field public participation activities provided
6. Number of heritage resource stabilization and rehabilitation projects conducted (comply with NHPA).	5 projects conducted	2 projects conducted	2 projects conducted	2 projects conducted	4 projects conducted
7. Increase in heritage resources listed on the National Register of Historic Places (comply with NHPA).	0 sites nominated to or listed on the NRHP	0 sites nominated to or listed on the NRHP	0 sites nominated to or listed on the NRHP	1 site nominated to or listed on the NRHP	0 sites nominated to or listed on the NRHP

Evaluation:

403. Improve the management of heritage resources and integrate them with recreation and education while providing for compliance with all applicable laws and regulations.

403.a. Over twenty interpretive opportunities per year have been provided during the five-year monitoring period including 23 in FY2004. Many of the opportunities have involved interpretive programs such as school programs, interpretive pamphlets, public tours, moonwalks, and presentation of research papers at professional conferences. The Forest objective is being met and in some cases exceeded by utilizing off-site activities and programs. In 2004 interpretive site and educational opportunity goals were met through field tours of the Craven Canyon petroglyphs, papers presented at the Island In the Plains Conference, which is co-sponsored by the Forest, school programs, and the successful implementation of three Passport In Time volunteer projects.

403.b. Four stabilization and rehabilitation projects were completed in 2004. The historic Miller Ranch House restoration project was completed by the Mystic District using the Passport In Time program under the Forest Section 110 program. Extensive stabilization and protection measures were also implemented at the eligible prehistoric Spring Creek site by the Mystic Ranger District. This project was funded and conducted through the Forest Section 106 compliance program. The Northern Hills District completed emergency stabilization at the eligible historic Mount Roosevelt site and at an eligible prehistoric property. All four projects were initiated and completed in consultation with the South Dakota State Historic Preservation Office and the Tribal Historic Preservation Offices of the Cheyenne River and Standing Rock Sioux Tribes. An increase in heritage program funding will be needed to meet the Forest objective of six projects per year over the planning period.

403.c. In 2004 the Forest completed extensive revisions to the National Register Nomination for the historic Mt. Roosevelt Tower. However no new nominations were initiated in FY2004. An increase in heritage program funding will be needed in order to meet Forest Plan objectives over the planning period.

403.d. During the previous five-year period an average of 54,000 acres has been inventoried each year. A sharp increase in acres surveyed has occurred over the past three years. This trend is expected to continue over the remaining years of the planning period due to increased fire risk, insect epidemics, and the implementation of forest health and watershed restoration initiatives.

404. Conduct three research projects each year to support heritage resource management.

In FY2004 the Forest, in partnership with the University of Wyoming under a cost-share agreement, conducted field research and scientific excavations at the prehistoric Williams Spring site. The 2004 session constituted Phase III of a long-term research project to document prehistoric settlement and resource use in the central Black Hills. Through the Passport In Time program and financial support from the Crook County Wyoming Resource Advisory Committee (RAC), a total of 22 volunteers contributed 1,192 hours of support to the Williams Spring project.

The Hell Canyon District completed a field survey and recording project for sensitive rock art sites in the Southern Hills. The project was conducted as a cost-share partnership with leading rock art expert Dr. Linea Sundstrom. This project was implemented as a Passport In Time program through which 22 volunteers contributed 900 hours of labor to a greater understanding of prehistoric rock art and the testing of different photographic techniques to record rock art panels.

In order to meet the Forest objective of three research projects per year, an increase in heritage program funding is needed. The Forest is currently meeting this objective at a minimum level through cost-share agreements with individual scientists and institutions.

405. Manage all heritage sites listed in the National Register of Historic Places in consultation with the State

Historic Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation (ACHP).

The Forest maintains a strong relationship with the South Dakota and Wyoming SHPOs, Advisory Council on Historic Preservation, and Tribal Historic Preservation Officers (THPO) on listed and eligible properties. The heritage program is meeting this objective.

406. Provide opportunities for the public to participate in heritage management activities, including the monitoring, excavation, and protection of archaeological sites.

The Forest successfully completed three Passport In Time projects including the Miller Ranch Restoration, Rock Art Survey, and Williams Spring excavation. A total of 66 volunteers who contributed 3,072 hours of labor participated in these three heritage preservation projects.

Table 2. 2004 Heritage Forest Plan Objectives Accomplishments

Accomplished	FY2000	FY2001	FY2002	FY2003	FY2004
Obj 403a. Heritage Sites Interpreted	27	34	21	29	23
Obj 403c. Eligible Sites Nominated	0	0	0	1	0
Obj 403d. Heritage Inventory (Acres)	28,686	41,713	78,891	61,375	59,758

Monitoring Item 30: Recreation Opportunities

Objectives:**407. Provide the following Recreation Opportunity Spectrum (ROS):**

Recreation Opportunity Spectrum (ROS) (Thousands of Acres)	
Primitive	11
Semi-Primitive Non-Motorized	18
Semi-Primitive Motorized	12
Roaded Natural	1107
Roaded Natural Non-Motorized	95
Rural	1

408. Manage recreation use to stay within the capacity for the ROS class:

ROS Class	Capacity Range Recreation Visitor Days (RVDs/Acre)		
	Low	Moderate	High
Primitive	0.25	0.5	0.75
Semi-Primitive Non-Motorized	1.00	2.0	3.00
Semi-Primitive Motorized	1.50	3.0	4.50
Roaded Natural Non-Motorized	1.50	3.0	4.50
Roaded Natural	3.00	6.0	9.00
Rural	<<<< Design Capacity >>>>		

Monitoring:**Recreation Activity: Recreation Opportunities across the Forest**

The 1997 Forest Plan identified objectives for capacities of the ROS classes expressed in recreation visitor days (RVDs). No monitoring data or techniques concerning this data were conducted in FY2004 to determine the degree to which the Forest is meeting this objective.

Evaluation:

Recreation opportunity spectrum capacity objectives by ROS class have not been monitored.

General anecdotal evidence of how well the Forest is meeting these objectives may be evident through monitoring of developed recreation use, dispersed recreation activities, and trail counter data from wilderness use.

Monitoring:**Developed Recreation Discussion**

The backlog of deferred maintenance needs for our developed sites continues to be a major concern related to meeting Forest Plan standards for maintaining developed recreation sites. Operation and maintenance funding from appropriated dollars has been historically insufficient to meet the needs. The Forest makes use of service partners wherever possible, such as our campground concessionaire. Forestwide, our fee sites are paying for day-to-day operation through the concession permit. Special-use fees paid to the Forest from the concessionaire are re-invested into our developed sites through the Granger-Thye fee offset program. In 2004, this fee system enabled the Forest to re-invest approximately \$55,000 in permit fees back into our developed sites. The Black Hills National Forest Visitor Center overlooking scenic Pactola Lake and satellite visitor information stations at our district offices provided significant developed-and-dispersed-recreation starting points for the visiting public.

Evaluation:

The success of the Forest's developed recreation management program could be considered an indication the Forest is meeting Forest Plan objectives in providing urban and roaded natural recreation opportunities within the capacity objective.

Monitoring:**Dispersed Recreation Discussion**

The Black Hills National Forest continues to be a leader in providing dispersed recreation as evidenced by the

following opportunities: Mickelson and Centennial Trails, snowmobiling, cross-country skiing, ATV and ORV routes, an established network of Forest roads and hiking trails, the Peter Norbeck Scenic Byway, a multitude of fishing opportunities at National Forest lakes, and some of the best elk and deer hunting in South Dakota and Wyoming.

The Black Hills National Forest is well roaded with over 6,000 miles of federal, state, county and Forest Service roads serving approximately 1.3 million acres of National Forest land.

Evaluation:

The dispersed recreation opportunities discussed here provide background information that the Forest is providing a wide range of ROS classes but with emphasis on roaded recreation opportunities, both roaded natural and/or semi-primitive motorized. How the Forest is doing in meeting the overall Forest Plan ROS objectives cannot be determined using the monitoring data currently gathered.

Monitoring Item 31: Recreation Use, Trends, and Demographics

Objectives:

- 413. Provide interpretation, information and environmental education as an important part of outdoor recreation. Use "Tread Lightly", "Leave No Trace" and other techniques.**
- 417. Coordinate trail development with the State Comprehensive Outdoor Recreation Plan (SCORP). Develop trail facilities in cooperation with other agencies and partners.**
- 419. Provide for the annual designation and management of 350 miles of snowmobile trail by the States of Wyoming and South Dakota. Annual changes to the trail system should be limited.**

Monitoring:

Objective 413

The Forest's interpretation information and environmental education efforts are monitored through the number of products offered. Recreation funding (NFRW) provided a target of 23 interpretation and environmental education products to standard, which was met and reported in the Forest's annual Management Attainment Report (MAR).

The Moon Walk program, offered by the Mystic Ranger District, presented six programs during the spring, summer, and fall across the Forest with participation by all districts. The Pactola Visitor Center, located along Highway 385, was open seven days a week from the middle of May to the end of September. The Visitor Center provided information, education, and interpretation exhibits, including "Tread Lightly" messages and literature, on the Forest and its environment to over 65,000 visitors.

Evaluation:

Through its visitor center, moon walks, wilderness education, and interpretive portal signs along with other information and education efforts, the Forest continues to meet this Forest Plan objective. The Forest's partnership with the Black Hills Parks and Forest Association also provided staffing assistance at the visitor center, publications and interpretive products at Forest outlets, and supplemental funding for interpretive exhibits at the visitor center.

Monitoring:

Objective 417

Total Forest funding for the South Dakota Department of Game, Fish, and Parks managed Mickelson Trail (old Burlington railroad route) over the past ten years has exceeded one million dollars. The Forest continued work on preparing plats for issuance of an easement for the route where it crosses National Forest System lands. The Forest provided its share of management of the Centennial Trail, a designated National Recreation Trail (NRT) jointly managed by Custer State Park, Black Hills National Forest, Bureau of Land Management, and the National Park Service. Trail work included annual trail maintenance and trail reconstruction efforts on the trail portions located on National Forest System lands.

Evaluation:

The Forest is meeting this Forest Plan objective through its cooperative management of the Mickelson Trail and the Centennial Trail, along with its input to the South Dakota State Comprehensive Outdoor Recreation Plan (SCORP).

Monitoring:

Objective 419

The Forest continued its participation in a Memorandum of Understanding (MOU) with the Wyoming and South Dakota Snowmobile Trail programs with snowmobile trails located, signed, managed, and groomed on the Bearlodge Ranger District by the State of Wyoming and on the Northern Hills, Mystic, and Hell Canyon Ranger Districts in South Dakota. The Forest issued its annual winter travel management special order, which provides for snowmobile and cross-country ski trails on the Forest.

Evaluation:

This Forest Plan objective is being met through the Forest's fulfillment of its responsibilities outlined in its MOUs with the Wyoming and South Dakota snowmobile programs.

Monitoring Item 32: Access and Road Mileage

Objectives:

309. Provide the following changes to the National Forest System roads in support of long-term sustainable production of commodities.

Road Construction	280 miles/decade
Road Reconstruction	870 miles/decade
Road Obliteration	140 miles/decade
Two-track Obliteration	270 miles/decade

420. Manage travel corridors for federal, state and county roads.

- a. Meet a scenic integrity objective of high.
- b. Provide recreation facilities, trailheads, trail crossings and other road corridor components to meet demand.
- c. Include opportunities for pedestrians and bicycle ways.
- d. Use cooperative opportunities for development of outdoor facilities, such as provided for in the Intermodal Surface Transportation Efficiency Act (ISTEA) as an integral part of corridor planning.

421. Provide the following road system:

Roads (By End of the First Decade)		
Suitable for Public Use		4,700 miles
Passenger Car	1,200 miles	
High Clearance Vehicles	3,500 miles	
Roads Closed to Vehicles		500 miles
TOTAL		5,200 miles

Monitoring:

Objective 309 and 421:

The following is the status of the National Forest System (NFS) roads in FY2003:

	FY00 Miles	FY01 Miles	FY02 Miles	FY03 Miles	FY04 Miles
NFS Maintenance Levels 1,2,3,4,5	5,281.1	5,385.1	5,397.1	5,449.0	5,443.0
NFS Miles Constructed	1.6	2.1	7.0	9.0	8.5
NFS Miles Reconstructed	53.6	21.3	75.7	87.0	102.0
NFS Miles Under Forest Service Jurisdiction	4,706.0	4,800.0	4,812.0	4,839.0	4,910.1
NFS Miles Under Local Government Jurisdiction	575.1	585.1	585.1	610.0	538.9

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	FY00 Miles	FY01 Miles	FY02 Miles	FY03 Miles	FY04 Miles
NFS Miles Obliterated	18.3	19.9	0	3.7	0.0
NFS Miles Open Year Long, Seasonally For Low Clearance Vehicles	734.0	741.0	718.0	715.0	673.5
NFS Miles Open Year Long, Seasonally Which Are Accessible To High Clearance Vehicles Only	3,236.0	3261.0	3,258.0	3158.0	3,129.0

	1997 Revised Forest Plan (Miles/decade)	Accomplished FY2000 (Miles)	Accomplished FY2001 (Miles)	Accomplished FY2002 (Miles)	Accomplished FY2003 (Miles)	Accomplished FY2004 (Miles)
Road Construction	280	1.6	2.1	7.0	9.0	8.5
Road Reconstruction	870	53.6	21.3	75.7	87.0	48.8
Road Obliteration	140	18.3	19.9	0	3.7	0
Two-track Obliteration	270	23.5	32.7	6.0	9.0	10.0

Evaluation:

Objectives 309 and 421

Forest Plan Activities (Miles)	Accomplished FY1998-FY2004	Percent of Annual Compliance FY1998 – FY2004	Current Level - Percent of Total Goal
Road Construction	8.9 miles/yr	32%	18%
Road Reconstruction	80.9 miles/yr	93%	55%
Road Obliteration	9.8 miles/yr	70%	49%
Two-track Obliteration	20.0 miles/yr	74%	48%
	Current Inventory		
Suitable for Public Use	3,802.5 miles		81%
Passenger Car	673.5 miles		56%
High Clearance Vehicles	3,129 miles		89%
Roads Closed To Vehicles	1,107.6 miles		221%

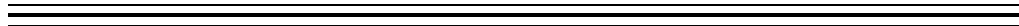
Monitoring Item 33: Access and Off-Road Vehicle Access

Objective 422. Provide the following off-road travel opportunities:

Category	Percentage of Forest
All Motorized Travel Allowed Yearlong	59.1%
Seasonal Restrictions Apply	22.8%
Seasonal Restrictions - No Off-road Travel	3.2%
Backcountry Motorized Recreation on Designated Trails	1.0%
Only OHV Travel Prohibited	11.4%
Motorized Travel Prohibited Except Snowmobiles	1.2%
All Motorized Travel Prohibited	1.3%

Monitoring:

The Forest is working towards updating the GIS database so accurate data runs can be conducted to determine the progress made on meeting the objectives for each of these travel management categories. A travel management mapping effort to determine and display accurate information for public use began in 2002 and is expected to be completed sometime in 2005. Accurate acreage reporting and determination of effective area closures, which have accompanying special orders available for enforcement, will result from this mapping effort.



Monitoring Item 34: Access and Trail Opportunities

Objectives.

416. Maintain and construct trails as displayed in the following table:

Non-motorized Trails (1996)	293 miles
Motorized Trails (1996)	14 miles
Non-motorized Trail Construction	204 miles
Motorized Trail Construction or Conversion from Road to Motorized Trail	15 miles
Total Forest Trail System	526 miles
Reconstruction	100 miles

418. Enhance the trail system to disperse use away from the Black Elk Wilderness.

Monitoring:

Objective 416

<i>1997 Revised Forest Plan</i>		FY2000	FY2001	FY2002	FY2003	FY2004
Existing Trail Inventory:						
Non-motorized Trails (1996)	293 miles	307.9	318.6	318.6	332.8	332.8
Motorized Trails (1996)	14 miles	14.2	14.2	14.2	13.7	13.7
New Trail Construction:	~	~	~	~	~	~
Non-motorized Trail Construction	204 miles ¹	0.00	0.00	0.0	0.0	0.0
Motorized Trail Construction or Conversion from Road to Motorized Trail	15 miles ¹	0.00	0.00	0.0	0.0	0
Total Forest Trail System	526 miles ²	322.1	332.8	332.8	346.5	346.5
Reconstruction	100 miles ¹	12.6	18.0	4.2	10.2	11.4

¹Per decade

²Total Miles at End of Decade

Evaluation:

Objective 416

Forest Plan Objective	Percent Compliance FY1998 – FY2003
Non-motorized Trail Construction	¹ 0%
Motorized Trail Construction or Conversion from Road to Motorized Trail	² 0%
Reconstruction	³ 114.0%

Figures are based on the following goals by the end of the first decade:

¹ increase of 20.4 miles per year

² increase of 1.5 miles per year

³ increase of 10 miles per year

Monitoring Item 35: Access and Right-Of-Way Acquisition

Objective 503. Acquire approximately 25 rights-of-way each year to improve Forest access.

Monitoring:

		FY2000			FY2001	
Type	Cases	Miles	Acres	Cases	Miles	Acres
Acquired	8	1.73	13.15	12	6.2	24.6
FLPMA*	~	~	~	~	~	~
Forest Road Easements Conveyed	3	1.10	4.7	4	3.5	14.1
Private Road Easements Conveyed	7	.95	4.9	3	6.7	26.7
FRTA** Easements ¹	0	0	0	0	0	0

		FY2002			FY2003	
Type	Cases	Miles	Acres	Cases	Miles	Acres
Acquired	3	4.2	10.6	2	2.9	11.8
FLPMA*	~	~	~	~	~	~
Forest Road Easements Conveyed	1	.09	.69	6	2.5	20.08
Private Road Easements Conveyed	17	6.06	25.8	14	1.9	15.37
FRTA** Easements ¹	0	0	0	2	0.3	2.52

		FY2004	
Type	Cases	Miles	Acres
Acquired	3	1.05	4.37
FLPMA*	~	~	~
Forest Road Easements Conveyed	7	13.8	57.51
Private Road Easements Conveyed	14	5.0	20.82
FRTA** Easements ¹	1	0.18	0.75

*FLPMA - Forest Land Policy Management Act

**FRTA - Forest Road and Trail Act

¹Previously under special use permit that was converted to easements in 1998

Evaluation:

The Forest has acquired 20 percent of the Forest Plan right-of-way objective in the 7 years of the 1997 Forest Plan.

Monitoring Item 36: Land Adjustment

Objectives:

- 501. Conduct approximately 500 to 1000 acres of land exchange each year over the decade, such as through purchase, exchange or donation, whenever lands meet land-adjustment criteria in Guidelines 8101 through 8104.
- 502. Provide timely response to landowner requests for access across the National Forest.
- 504. Actively seek local government and tribal government input and support for those exchanges that substantially change the balance of federal and private lands.
- 505. Work with conservation groups, state agencies and others to develop and implement cost-effective land and resource protection measures such as conservation easements, etc.

Monitoring:

Land Acquired Through Acquisition

	FY2000	FY2001	FY2002	FY2003	FY2004
Land Adjustment Completed	Acres	Acres	Acres	Acres	Acres
Land Acquired through Purchase	~	~	259	966	282
Land Acquired through Exchange	526	170	330	433	0
Land Acquired through Donation	0	0	0	80	0
Total Acquired	526	170	589	1,479	0
LESS:	~	~	~	~	~
Land Conveyed Out	575	89	176	475	11
NET CHANGE	-49	+81	+413	+1,004	+271

Land Being Acquired Through Acquisition

~	FY2000	FY2001	FY2002	FY2003	FY2004
Land Adjustment Being Processed	Acres	Acres	Acres	Acres	Acres
Land Acquiring through Purchase			1,156	280	0
Land Acquiring through Exchange	683	617	473	1,020	900
Land Acquiring through Donation	80	80	80	0	0
Total Acquiring	763	697	1,709	1,300	900
LESS:	~	~	~	~	~
Land Conveying Out	606	641	504	1,070	1,376
NET CHANGE	+157	+56	+1,205	+230	-476

Evaluation:

The Forest has continued to foster communication with several conservation groups and state agencies with the objective of completing land adjustment exchanges and/or conservation easements for everyone's benefit. The Forest is a member of the Black Hills Conservation Initiative, which is a partnership of private landowners, communities, state and federal agencies, and other conservation groups, to protect wildlife habitat and open space. The Forest has stressed land exchanges over conservation easements as the means to benefit the public. These exchanges can be time consuming (sometimes as long as three to five years), but the outcome of a more efficient and manageable land pattern is worth the time and effort expended.

Landowner requests for access across the National Forest are acted on as quickly as possible. The Forest has also been given the authority to sign the permits authorizing this use. Previously, the permits needed to be signed by the Regional Office. This change will be a benefit to the public because requests can be acted on more quickly.

The Forest actively seeks input and support from local and tribal governments with respect to land exchanges. The local and tribal governments are notified early in the exchange process and asked if they have any concerns or recommendations regarding the exchange proposal. Any concerns or recommendations related are considered and evaluated throughout the exchange process. The governments are again notified during the NEPA phase of the project and again at the time of a decision being made.

Monitoring Item 37: Economic Efficiency

Objectives:

601. Strive to reduce net costs of both market and non-market programs.

602. Maintain the ability to respond to budget reductions by keeping overhead and fixed costs, including salaries, at less than 70 percent of the Forest budget.

Monitoring:

Objective 601

FUND CODE		FY98	FY99	FY00	FY2001	FY2002	FY2003	FY 2004
	FUND	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS
	RECREATION, WILDERNESS AND HERITAGE RESOURCES	~	~	~	~	~	~	~
	OPERATIONS	~	~	~	~	~	~	~
NFRW	Recreation/Heritage/Wilderness	989,000	679,000	698,000	908,600	894,800	900,300	865,400
	INVESTMENTS	~	~	~	~	~	~	~
CMTL	Trail Capital Improvements & Mtce.	222,000	170,000	277,800	308,100	251,700	344,500	219,100
	TOTAL RECREATION WILDERNESS AND HERITAGE	1,211,000	849,000	975,800	1,216,700	1,146,500	1,244,800	1,084,500
	WILDLIFE AND FISH	~	~	~	~	~	~	~
NFWF	Wildlife & Fisheries Habitat Mgmt.	287,000	236,000	176,000	304,800	237,000	330,900	301,900
	TOTAL WILDLIFE AND FISH	287,000	236,000	176,000	304,800	237,000	330,900	301,900
	RANGE	~	~	~	~	~	~	~
NFRG	Livestock Grazing Management	317,000	457,000	307,800	405,400	387,700	470,000	362,300
RBRB	Range Betterment	52,000	68,000	48,300	51,400	42,300	68,100	43,600
NFN3	Rehabilitation & Restoration	*	*	*	4,940,300	2,570,600	281,800	~
	TOTAL RANGE	369,000	525,000	356,100	5,397,000	3,000,600	819,900	405,900

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FUND CODE		FY98	FY99	FY00	FY2001	FY2002	FY2003	FY 2004
	FUND	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS
	TIMBER	~	~	~	~	~	~	~
	OPERATIONS	~	~	~	~	~	~	~
NFTM	Timber Management – Forest Products	4,933,000	5,109,000	3,900,400	4,921,000	7,539,100	4,753,200	5,546,700
	SALVAGE	~	~	~	~	~	~	~
SSSS	Timber Salvage	349,000	950,000	597,400	801,100	1,368,000	1,885,900	1,536,500
	TOTAL TIMBER	5,282,000	6,059,000	4,497,800	5,722,100	8,907,100	6,639,100	7,083,200
	WATER, SOIL, AND AIR	~	~	~	~	~	~	~
NFVW	Vegetation & Watershed Mgmt.	922,000	638,000	630,900	1,361,000	835,100	881,200	1,139,400
TRTR	Ten Percent Road and Trail Fund	458,000	1,010,000	476,800	357,100	57,800	393,000	77,100
	TOTAL WATER, SOIL AND AIR OPERATIONS	1,380,000	1,648,000	1,107,700	1,718,100	892,900	1,274,200	1,216,500
	MINERALS	~	~	~	~	~	~	~
NFMG	Minerals	206,000	192,000	161,200	432,600	324,200	370,600	372,900
	Less Revenues:	7,294	6,304	6,800	12,500	16,000	17,200	28,300
	TOTAL MINERALS	198,706	185,696	154,400	420,100	308,200	353,400	344,600
	INFRASTRUCTURE	~	~	~	~	~	~	~
	OPERATIONS	~	~	~	~	~	~	~
QMQM	Quarters Maintenance	32,000	61,000	16,900	4,900	14,800	38,200	40,700
HTER	Flood Repair	66,000	1,000	-0-	-0-	-0-	-0-	~
HWHW	Hazardous Waste Management (Nemo)	380,000	-0-	20,000	58,600	16,400	22,600	~
CMII	Deferred Maintenance	*	*	*	349,900	685,000	109,000	268,100
	INVESTMENTS	~	~	~	~	~	~	~
CMFC	Facilities Capital Improvements & Mtce.	239,000	584,000	1,722,700	1,260,400	648,800	5,517,100	5,876,800
CMRD	Roads Capital Improvements & Mtce.	1,609,000	1,970,000	1,942,000	2,300,300	2,452,700	3,199,300	2,934,600
	TOTAL INFRASTRUCTURE	2,326,000	2,616,000	3,701,600	3,974,100	3,817,700	8,886,200	9,120,200

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FUND CODE		FY98	FY99	FY00	FY2001	FY2002	FY2003	FY 2004
	FUND	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS
	REAL ESTATE, PLANNING, AND LAW ENFORCEMENT	~	~	~	~	~	~	~
NFPN	Land Management Planning	240,000	115,000	289,200	987,200	1,488,700	1,516,000	488,300
NFIM	Inventory and Monitoring	70,000	254,000	1,436,500	1,481,600	996,900	345,100	233,300
NFMP	Inventory & Monitoring (Title VIII)	*	*	*	66,600	*	*	~
NFLE	Law Enforcement	95,000	71,000	52,700	91,000	86,100	-0-	-0-
NFLM	Landownership Mgmt.	524,000	486,000	668,400	724,900	617,600	672,400	495,600
LALW	Land Acquisition, Land and Water	32,000	16,000	36,500	15,200	52,400	99,400	17,300
LAAQ	Land Acquisition	*	*	*	5,200	42,200	*	~
SPEA	Economic Action Program (Community Assistance)	34,000	30,000	30,000	45,000	10,000	45,400	20,500
SPS4	Forest Health Management	*	*	*	*	*	152,100	516,800
SPS6	Economic Action, Tribal YCC, Rural Community Assist.	*	*	*	20,100	40,000	120,000	~
SPS7	Economic Action, Fire Protection & Pilot	*	*	*	166,000	-0-	-0-	~
	TOTAL REAL ESTATE, PLANNING, AND LAW ENFORCEMENT	995,000	972,000	2,513,300	3,602,800	3,333,900	2,950,400	1,771,800
NFGA	GENERAL ADMINISTRATION	1,287,000	1,498,000	981,600	*	*	*	~
	TRUST FUNDS	~	~	~	~	~	~	~
CWKV	Knutson-Vandenberg	3,320,000	2,591,000	2,678,400	1,837,400	1,509,500	2,236,100	2,054,600
RTRT	Reforestation	164,000	109,000	-0-	9,600	37,000	200,000	511,900
CWFS	Other Coop Work	603,000	432,000	298,300	131,100	130,900	625,973	533,300
NFNF	NFS-Protection and Management Reimbursements	211,000	408,000	461,800	249,500	359,200	126,900	241,700
HTAE	Federal Highway Administration Expense	7,000	13,000	12,000	10,400	7,000	10,000	10,700
NWBM1	Water System Improvements	*	82,000	*	*	*	*	~
PEPE	Timber Roads Purchaser Elective	*	371,000	37,100	55,700	273,300	197,600	239,100

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FUND CODE		FY98	FY99	FY00	FY2001	FY2002	FY2003	FY 2004
	FUND	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS
SPFH	Forest Health Management, Federal Land	26,000	133,000	7,200	240,200	291,600	210,900	~
NFSD NFSA	Senior Community Service Employment Program	41,000	136,000	131,800	143,600	131,400	95,900	111,200
	TOTAL TRUST FUNDS	4,372,000	4,275,000	3,626,600	2,677,500	2,739,900	3,703,373	3,702,500
	FIRE MANAGEMENT	~	~	~	~	~	~	~
BDBD	Brush Disposal	170,000	228,000	227,200	216,100	203,700	286,900	334,000
NFCC	Vegetation Treatment	*	~	~	~	~	352,700	431,600
WFPR	Fire Pre-suppression	1,676,000	2,174,000	2,738,500	3,769,500	3,478,200	3,026,700	3,412,000
WFHF	Hazardous Fuel Reduction (Title II)	362,000	451,000	810,300	952,800	2,536,900	2,371,300	2,866,400
WFW2	Hazardous Fuels Reduction (Title IV)	*	*	*	2,398,900	*	*	~
WFSU	Emergency Suppression and Rehabilitation	812,000	941,000	6,639,600	6,663,800	10,042,400	6,405,400	2,141,900
	TOTAL FIRE MANAGEMENT	3,020,000	3,794,000	10,415,600	14,001,100	16,261,200	12,443,000	9,185,900
	TOTAL ALL	\$20,735,000	\$22,664,000	\$28,513,300	\$39,046,900	\$40,661,000	\$38,662,473	\$34,217,000

*New or discontinued fund codes

Black Hills National Forest

Receipts:

Gross receipts before payments to counties:

	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004
DESCRIPTION	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS	DOLLARS
Timber	16,680,806	15,064,311	13,893,300	6,516,500	8,966,500	6,924,200	13,874,000
Grazing	117,983	117,186	118,300	106,300	116,300	107,500	120,700
Recreation - Special Uses (recreation residences)	74,499	80,198	133,900	108,200	118,200	142,100	128,600
Recreation - User Fees (admissions, outfitter guide permits)	31,213	15,546	21,500	20,400	21,400	26,000	38,700
Utility Special Use Permits	73,400	39,493	38,800	39,600	39,900	37,900	38,100
Minerals	7,294	6,304	6,800	12,500	16,000	17,200	28,300
Special Uses other than Recreation, Utilities, and Minerals	40,587	55,581	44,700	42,800	40,900	51,700	56,500
TOTAL	\$17,025,782	\$15,378,619	\$14,257,300	\$6,846,300	\$9,319,200	\$7,306,600	\$14,284,900

Black Hills National Forest

Evaluation:

Objective 601.

Program	Net Operating Costs						
	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Recreation, Wilderness & Heritage Resources	(991,301)	(658,181)	(736,900)	(1,005,700)	(926,100)	(987,100)	(917,200)
Wildlife & Fish Operations	(287,000)	(236,000)	(176,000)	(304,800)	(237,000)	(330,900)	(301,900)
Range Operations	(251,017)	(407,814)	(237,800)	(5,290,800)	(2,884,300)	(712,400)	(285,200)
Timber Operations	11,398,806	9,005,311	9,395,500	794,400	59,400	285,100	6,790,800
Water, Soil, & Air Operations	(1,380,000)	(1,648,000)	(1,107,700)	(1,718,100)	(892,900)	(1,274,200)	(1,216,500)
Minerals	(198,706)	(185,696)	(154,400)	(420,100)	(308,200)	(353,400)	(316,300)
Infrastructure	(2,326,000)	(2,616,000)	(3,701,600)	(3,974,100)	(3,817,700)	(8,886,200)	(9,120,200)
Planning	(240,000)	(115,000)	(289,200)	(987,200)	(1,488,700)	(1,516,000)	(488,300)
Inventory & Monitoring	(70,000)	(254,000)	(1,436,500)	(1,548,200)	(996,900)	(345,100)	(233,300)
Law Enforcement	(95,000)	(71,000)	(52,700)	(91,000)	(86,100)	(Regional)	(495,600)
Real Estate	(556,000)	(502,000)	(704,900)	(745,300)	(712,200)	(771,800)	(439,500)
Economic Action Programs	(34,000)	(30,000)	(30,000)	(231,100)	(50,000)	(317,500)	(20,500)
General Administration	(1,287,000)	(1,498,000)	(981,600)	0	0	0	0
Trust Funds	(4,372,000)	(4,275,000)	(3,626,600)	(2,677,500)	(2,739,900)	(3,703,373)	(3,702,500)
Fire Management	(2,208,000)	(2,853,000)	(3,776,000)	(7,337,300)	(10,042,400)	(6,405,400)	(7,044,000)
TOTAL PLANNED	(2,897,218)	(6,344,381)	(7,616,400)	(25,536,800)	(25,123,000)	(25,318,273)	(17,790,200)
Emergency Fire Suppression and Rehabilitation	(812,000)	(941,000)	(6,639,600)	(6,663,800)	(6,218,800)	(6,037,600)	(2,141,900)
TOTAL EXPENDED	(3,709,218)	(7,285,381)	(14,256,000)	(32,200,600)	(31,341,800)	(31,355,873)	(\$19,932,100)

Black Hills National Forest

Program costs totaled \$34.2 million in FY2004 of which \$9.2 million was fire management. Revenues totaled \$14.3 million in FY2004. Timber revenues increased from \$6.9 million in FY2003 to \$13.9 million in 2004.

Net operating costs for FY2004 were \$19.9 million, down considerably from 2003 due to increased timber receipts and reduced fire suppression and rehabilitation costs.

Both fire suppression and fire restoration and rehabilitation are unplanned expenses and are not annual budget items. Fire suppression and fire restoration costs were down in FY 2004 because no large fires occurred on the Forest and restoration from previous large fires since 1997 is nearing completion. Timber receipts were up significantly from 2003 due to increase harvesting from existing timber sale contracts.

Monitoring:

Objective 602

Fixed costs were 66.4 percent of Forest budget costs, based on Fixed costs of \$19.5 million and an original budget of \$29.3 million. The Forest fixed cost expenditures remain at less than 70 percent of Forest budget.

List of Preparers

Item Number	Monitoring Item	Preparers
Introduction	What This Document Is	Jeffrey Ulrich
	Forest Plan Amendments	Edward Fischer
1	Air Quality	Dean Berger
9	Vegetative Diversity - Snag Retention	Blaine Cook
13	Regeneration	Blaine Cook
14	Timber Production	Blaine Cook
17	Forage Utilization	Craig Beckner
18a	Sensitive Species: Plants	Deanna Reyher
20a	Pine Beetle Susceptibility	Blaine Cook and Kurt Allen
20b	Pine Beetle Levels and Trends	Blaine Cook and Kurt Allen
20c	Insect and Disease Evaluations	Blaine Cook and Kurt Allen
21	Exotics	Blaine Cook and Kurt Allen
22	Fuel Loading Hazard ³	Dean Berger
23	Fuel Treatment	Dean Berger
24a	Fire Suppression	Dean Berger
24b	Fire Prevention	Dean Berger
25	Wildlife – Threatened and Endangered	Cara Staab
26	Habitat Capability Relationships, including Management Indicator Species (MIS) for Wildlife	Cara Staab and Steve Hirtzel
27	Scenic Integrity	Steve Keegan
28	Heritage Resources	Dave McKee
30	Recreation Opportunities	Rick Hudson
31	Recreation Use, Trends and Demographics	Rick Hudson
32	Access: Road Mileage	Craig Kjar
33	Access: Access and Off-Road Vehicle Access	Rick Hudson
34	Access: Trail Opportunities	Craig Kjar
35	Access: Right-of-Way Acquisition	Glenn Kostelecky
36	Real Estate: Land Adjustment	Glenn Kostelecky
37	Economic Efficiency	Jeffrey L. Ulrich
	Compiling and Editing	Peggy Woodward

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